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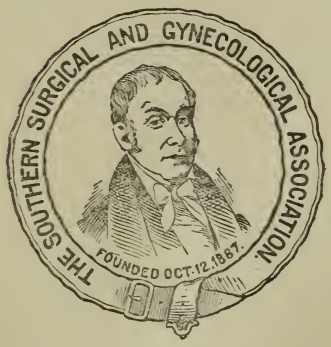

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CONTENTS.

	PAGE
Officers	iii
Honorary Members	ix
Members	xi
Constitution	xxix
By-Laws	xxxi
Minutes of the Thirteenth Annual Meeting	xxxv

Annual Address of the President: A Plea for the Better Appreciation of the Limitations of our Operative Work. By A. MORGAN CARTLEDGE, M.D. 1
Medullary Narcosis. By W. L. RODMAN, M.D. . . . 8
The Removal of Pelvic Inflammatory Masses by the Abdomen After Bisection of the Uterus. By HOWARD A. KELLY, M.D. 25
Osteofibromyoma of the Uterus. By GEORGE BEN JOHNSTON, M.D. 39
Examination of Tumor of the Uterus. By WILLIAM H. WELCH, M.D. 41
Appendicitis in the Male and Female. By FLOYD W. MCRAE, M.D. 45
Drainage in Abdominal Surgery. By J. W. LONG, M.D. . 66
A Flap Operation for Atresia of the Vagina. By GEORGE HENRY NOBLE, M.D. 78
Recent Technical Improvements in the Surgery of the Stomach for Carcinoma. By WILLIS G. MACDONALD, M.D. . . 84
Normal Menstruation. By GEORGE J. ENGELMANN, M.D. . 97
An Operation Devised for the Treatment of Marked Prolapse of the Rectum in Women. By J. WESLEY BOVÉE, M.D. 108
Excision of the External Carotid Artery for Inoperable Sarcoma of the Face, with Report of Cases. By WILLIAM PERRIN NICOLSON, M.D. 112
Auto-intoxication from Renal Insufficiency, with and without Diseased Kidneys; with Report of Some Remarkable Cases. By JAMES T. JELKS, M.D. 121
Pseudomembranous Enteritis and its Relation to Abdominal Surgery. By FRANK A. GLASGOW, M.D. 132
Vesicovaginal Fistulæ. By M. C. MCGANNON, M.D. . . 139
Supplementary Report (*a*) on a Case of Litholapaxy; (*b*) On a Case of Vesicorectal Fistula. By GEORGE S. BROWN, M.D. 148

PAGE

Some Life-saving Measures in Obstetric Work. By R. R. KIME, M.D. 153
A Rapid and Simple Operation for Gallstones Found by Exploring the Abdomen in the Course of a Lower Abdominal Operation. By HOWARD A. KELLY, M.D. . . . 164
Irreducible Incarcerated Retroflexed Gravid Uterus. By WILLIAM A. QUINN, M.D. 177
A Solid Ovarian Tumor. By JOHN G. EARNEST, M.D. . . 184
Hypospadias and Epispadias, with Special Reference to Their Operative Treatment. By F. W. PARHAM, M.D. . . 188
Osteoarthritis of the Spine. By MICHAEL HOKE, M.D. . . 229
Carbolic Acid in Surgery. By SENECA D. POWELL, M.D. . 238
The Treatment of Abdominal Aortic Aneurism by a Preliminary Exploratory Cœliotomy and Peritoneal Exclusion of the Sac, Followed at a Later Sitting by Wiring and Electrolysis, with the Report of Two Hitherto Unpublished Cases. By RUDOLPH MATAS, M.D. 272
Dislocation of Humerus with Fracture of the Upper Part of Shaft. By N. P. DANDRIDGE, M.D. 331
Resection of the Rectum per Vaginam. By JOHN B. MURPHY, M.D. 334
Traumatic Gangrene. By J. B. MURFREE, M.D. . . . 348
Gastro-enterostomy with the Murphy Button in Malignant Obstructions of the Pylorus. By FRANK T. MERIWETHER, M.D. 355
The Surgery of the Gasserian Ganglion. By WALLACE NEFF, M.D. 364
Résumé of the Latest Literature on Tuberculosis of the Peritoneum. By WALLACE NEFF, M.D. 377
Subphrenic Abscess as a Complication of Appendicitis. By J. McF. GASTON, JR., M.D. 387
An Unique Case of Intrapelvic Hemorrhage Due to a Hitherto Undescribed New-growth. By W. P. MANTON, M.D. . 397
Some Remarks on Epidural Hemorrhage without Fracture of the Skull, and Report of a Case. By J. SHELTON HORSLEY, M.D. 405
Resection of the Cervical Sympathetic for Glaucoma. By HOWARD J. WILLIAMS, M.D. 410
Puerperal Sepsis: A Plea for Greater Accuracy in Diagnosis, to the end that the Treatment may be more Rational and Effective. By MILES F. PORTER, M.D. 421
An Automatic Ligature Passer. By E. PIERRE MALLETT, M.D. 426
An Apparatus for Draining the Bladder in Cases of Suprapubic Cystotomy. By E. D. MARTIN, M.D. 430

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1888.—Miller, C. Jeff., M.D. Chief of Clinic to the Chair of Diseases of Women and Obstetrics, Tulane University of Louisiana; Lecturer on Gynecology and Obstetrics in New Orleans Polyclinic; Visiting Gynecologist to Charity Hospital. 1719 Jackson Avenue, New Orleans, La.

1899.—Milliken, Samuel E., M.D. 449 Elm Street, Dallas, Texas.

1891.—Murfree, James Brickle, M.D. Professor of Surgery, University of the South (Sewanee); ex-President of the Tennessee State Medical Society, and of the Tri-State Medical Society of Alabama, Georgia, and Tennessee. Murfreesboro, Tenn.

1894.—Murphy, J. B., M.D. Professor of Surgery, Northwestern University; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon to Cook County and Mercy Hospitals. 100 State Street, Chicago, Ill.

1896.—Myers, William H., M.D. Surgeon to St. Joseph's Hospital; Fellow of the American Association of Obstetricians and Gynecologists; Member of the American and British Medical Association; Member of the Pathological Society of London; Member of the International Congress of Gynecologists and Obstetricians; Member of the Chicago Medical Society. Fort Wayne, Ind.

Founder.—Nash, Herbert Milton, M.D. Consulting Surgeon to the Retreat for the Sick (Hospital), Norfolk; Consultant to the Staff of St. Vincent's Hospital; ex-President of the Norfolk City Medical Society; Member of the State Board of Medical Examiners of Virginia. 296 Freemason Street, Norfolk, Va.

1899.—Neff, Wallace, M.D. Formerly Adjunct Professor of Clinical Surgery and Surgical Pathology, Medical College of Ohio (University of Cincinnati); late Major and Brigade Surgeon U. S. V. 1730 Connecticut Avenue, N. W., Washington, D. C.

1891.—Nelson, H. T., M.D. Member of the Medical Examining Board of Virginia. Charlottesville, Va.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons. Prudential Building, Atlanta, Ga.

1896.—Noble, Charles P., M.D. Surgeon-in-Chief, Kensington Hospital for Women; Consulting Surgeon, Woman's

Hospital; Lecturer on Gynecology, Philadelphia Polyclinic. 1500 Locust Street, Philadelphia, Pa.

1890.—Noble, George H., M.D. Ex-President of the Georgia Medical Association; ex-Secretary of Obstetrical Section of the American Medical Association. 131 S. Pryor Street, Atlanta, Ga.

1890.—Nunn, R. J., M.D. Savannah, Ga.

Founder.—Paine, John Fannin Young, M.D. Dean and Professor of Obstetrics and Diseases of Women and Children in the Texas Medical College and Hospital; Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Texas Medical Association. 2177 Market Street, Galveston, Texas.

1888.—Parham, F. W., M.D. Professor in the New Orleans Polyclinic. 1429 Seventh Street, New Orleans, La.

1893.—Parker, William E., M.D. Visiting Surgeon to the Charity Hospital. *Vice-President*, 1897. 124 Broad Street, New Orleans, La.

1899.—Perkins, W. M., M.D. Chief of Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. 205 Baronne Street, New Orleans, La.

1898.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 7 East 36th Street, New York.

1900.—Porter, Miles F., M.D. Trustee of American Medical Association. 47 West Wayne Street, Ft. Wayne, Ind.

1889.—Potter, William Warren, M.D. Consulting Gynecologist to the Woman's Hospital; Consulting Surgeon to the Buffalo General Hospital; President and Examiner in Obstetrics, New York State Medical Examining and Licensing Board; Chairman of Section of Obstetrics and Diseases of Women, American Medical Association, 1890; President of the Buffalo Obstetrical Society, 1884–1886; President of the Medical Society of the State

of New York, 1891; Executive President of the Section of Gynecology and Abdominal Surgery, Pan-American Medical Congress, 1893. 284 Franklin Street, Buffalo, N. Y.

1894.—Powell, Seneca D., M.D., LL.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital, and Secretary to the Faculty; Visiting Surgeon to the Post-Graduate Hospital, and to St. Mark's Hospital. 12 West 40th Street, New York, N. Y.

1889.—Price, Joseph, M.D. Physician-in-Charge of the Obstetrical and Gynecological Department of the Philadelphia Dispensary; Fellow of the American Association of Obstetricians and Gynecologists; ex-Chairman, Section of Diseases of Women and Obstetrics, American Medical Association. *Vice-President*, 1893. 241 N. Eighteenth Street, Philadelphia, Pa.

1899.—Quinn, W. A., M.D. Henderson, Ky.

1890.—Reamy, Thaddeus Asbury, M.D., LL.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical Department, University of Cincinnati); Gynecologist to Good Samaritan Hospital; Consulting Gynecologist to Christ's Hospital; ex-President to Cincinnati Academy of Medicine, and Cincinnati Obstetrical Society; Member American Medical Association; ex-President Ohio State Medical Society, and American Gynecological Society. 609 Oak Street, Cincinnati, O.

1890.—Reed, Charles Alfred Lee, M.D. President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. Corner Seventh and Race Streets, Cincinnati, O.

1900.—Rees, Charles M., M.D. Professor of Obstetrics, Charleston Medical School; Gynecologist to Shirro's Dispensary. Charleston, S. C.

1894.—Rhett, R. B., M.D. Dean and Professor of Surgery, Charleston Medical College; Surgeon to City Hospital. Charleston, S. C.

1899.—Richardson, Maurice Howe, M.D. Visiting Surgeon to the Massachusetts General Hospital; Assistant Professor of Clinical Surgery, Harvard Medical School. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *Vice-President,* 1889. 1520 Third Street, Louisville, Ky.

1889.—Robinson, William Lovaille, M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Danville Medical Society; Member of the Medical Examining Board of Virginia; ex-President of Virginia Medical Society. 753 Main Street, Danville, Va.

1892.—Rodman, William L., M.D. Professor of the Principles of Surgery and Clinical Surgery in the Medico-Chirurgical College. 1626 Spruce Street, Philadelphia, Pa.

Founder.—Rogers, William Boddie, M.D. Professor of the Practice of Surgery and Clinical Surgery, Memphis Hospital Medical College; ex-Vice-President of the American Medical Association and National Association of Railway Surgeons. Porter Building, Memphis, Tenn.

1899.—Royster, Hubert A., A.B., M.D. One of the Visiting Staff of the Rex Hospital; Surgeon-in-Charge of St. Agnes' Hospital. Tucker Building, Raleigh, N. C.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Ft. Worth University; Chief Surgeon Ft. Worth & Denver City Railway, and of Wichita Valley Railway; Division Surgeon, Texas Pacific Railway, Gulf, Colorado & Santa Fe Railway, and St. Louis & Southwestern Railway; ex-President Texas State Medical Association; Member American Medical Association, and the International Association of Railway Surgeons, etc. Ninth and Houston Streets, Ft. Worth, Texas.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Texas.

1893.—Senn, Nicholas, M.D., Ph.D., LL.D. Professor of Practice of Surgery and Clinical Surgery, Rush Medical College; Professor of the Practice of Surgery, Chicago Polyclinic; Attending Surgeon, Presbyterian Hospital; Surgeon to St. Joseph's Hospital; ex-President of the American Surgical Association

and of the American Medical Association. 532 Dearborn Avenue, Chicago, Ill.

1899.—SHANDS, A. R., M.D. Professor of Orthopedic Surgery, Columbian University. 1328 New York Avenue, N. W., Washington, D. C.

Founder.—SHIVERS, OFFA LUNDSFORD, M.D. Councillor of the Alabama Medical Association. Marion, Ala.

1893.—SIMONS, MANNING, M.D. Professor of Clinical Surgery, Medical College, State of South Carolina; Surgeon to St. Francis Xavier's Infirmary; Surgeon to City Hospital; ex-President South Carolina Medical Association, and Medical Society of South Carolina; ex-Vice-President Tri-State Medical Society of Virginia and the Carolinas. *Vice-President*, 1895 and 1900; *President*, 1901. 111 Church Street, Charleston, S. C.

1892.—SIMONS, T. GRANGE, M.D. Ex-President of the South Carolina Medical Association; Member of the State Board of Health of South Carolina; formerly President of the Charleston County Medical Society. Charleston, S. C.

1900.—SIMPSON, FRANK FARROW, M.D. Assistant Gynecologist to Mercy Hospital; Gynecologist to Out-Patient Department, Mercy Hospital. 524 Pennsylvania Avenue, Pittsburg, Pa.

1894.—SMITH, REGINALD K., M.D. 507 Harrison Street, San Francisco, Cal.

1899.—SMYTHE, FRANK DAVIE, M.D. Surgeon to St. Joseph's Hospital; Assistant Professor of Surgery, Memphis Hospital Medical College; Demonstrator of Operative Surgery; formerly Member of the State Board of Examiners of Mississippi. Porter Building, Memphis, Tenn.

Founder.—SOUCHON, EDMOND, M.D. Professor of Anatomy and Clinical Surgery, Medical Department of the Tulane University; Member of the American Surgical Association; President Louisiana State Board of Health. 135 Baronne Street, New Orleans, La.

Founder.—STONE, ISAAC SCOTT, M.D. Clinical Professor of Gynecology, Georgetown University; Gynecologist of Columbia Hospital; Member American and British Gynecological Societies; Honorary Fellow of Medical Society of the State of New York; Fellow of the Medical Society of Virginia; Member Washington Academy of Sciences, Washington Obstetrical and Gynecological

Society, Medical Society, and Medical and Surgical Society of the District of Columbia. 1449 Rhode Island Avenue, N. W., Washington, D. C.

1894.—Talley, D. F., M.D. Ex-President Jefferson County Medical Society; Professor of Materia Medica and Lecturer on Surgery, Birmingham Medical College, Birmingham, Ala.

Founder.—Taylor, Benjamin W., M.D. Ex-President of Columbia Medical Society and of South Carolina State Medical Association; Chief Surgeon Columbia Hospital; President of Board of Regents, South Carolina Hospital for the Insane; Consulting Surgeon South Carolina Hospital for the Insane; Member of the National Railway Surgeons and American Medical Associations; ex-Member State Board of Medical Examiners. 1409 Plain Street, Columbia, S. C.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—Taylor, William Wood, A.B., M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 246 Randolph Building, Memphis, Tenn.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1891.—Tiffany, Louis McLane, M.D. Professor of Surgery in the University of Maryland; Fellow of the American Surgical Association. *President,* 1895. 831 Park Avenue, Baltimore, Md.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. 116 E. Franklin Street, Richmond, Va.

1891.—Trippe, Richard Jefferson, M.D. Ex-President of the Chattanooga Medical Society. Chattanooga, Tenn.

1888.—Tuholske, Herman, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital, etc. 410 North Jefferson Street, St. Louis, Mo.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; Fellow of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists;

ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, N. Y.

1891.—WALKER, EDWIN, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1898.—WATKINS, ISAAC LAFAYETTE, M.D. President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1888.—WESTMORELAND, WILLIS F., M.D. Professor of Surgery, Atlanta Medical College. 241 Equitable Building, Atlanta, Ga.

1900.—WILLIAMS, HOWARD J., A.B., A.M., M.D. Surgeon to Macon Hospital; Chief Surgeon to M., D. & S. R. R.; Surgeon to Central of Ga. R. R., So. Rwy. and Ga. R. R.; ex-President of the Medical Association of Georgia, etc. 550 Orange Street, Macon, Ga.

1897.—WILLIAMS, ROBERT F., M.D. Professor of Materia Medica and Therapeutics, and Clinical Lecturer on Practice of Medicine, Medical College of Virginia; Visiting Physician to Old Dominion Hospital, and City Free Dispensary. 508 East Grace Street, Richmond, Va.

Founder.—WILSON, J. T., M.D. Ex-President of the North Texas Medical Association; President of the Texas Medical Association; Superintendent of the State Hospital for the Insane. *Vice-President*, 1891. Terrell, Texas.

1891.—WYETH, JOHN ALLEN, M.D. Professor of Surgery in the New York Polyclinic; Consulting Surgeon to St. Elizabeth's Hospital; Visiting Surgeon to Mt. Sinai Hospital and Polyclinic Hospital; Honorary Member of the Texas State Medical Association; President of the New York State Medical Association; ex-President of the New York Pathological Society. 19 West Thirty-fifth Street, New York, N. Y.

1900.—WYSOR, JOHN C., M.D. Surgeon-in-Charge, C. & O. Hospital. Clifton Forge, Va.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be The Southern Surgical and Gynecological Association.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

Section 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

Sec. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

Section 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot, without nomination.

Sec. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for re-election at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association by the seal of the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and be chairman of the Publishing Committee.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint a Committee of Finance, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same at the next session of the Association.

ARTICLE VII.

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

Any member who for three consecutive years fails to attend the meetings shall be dropped from the roll of membership.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the second Tuesday of November at 10 A.M., at such place as may be designated by the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive, at each annual Session, a draft from the President, drawn on the Treasurer, for the sum of $100 for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify by circular letter the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of all essays shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the circular letter to the members.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so

that subsequently one member of the Council shall be elected annually to serve five years. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The following are the standing committees of the Association to be filled by the President and to report at the next annual meeting subsequent to their appointment, viz.: Committee of Arrangements and Committee of Publication. The Committee of Publication shall consist of three members, one of whom, the Secretary of the Association, shall also be the chairman of the said committee. The Committee of Arrangements shall consist of five members.

ARTICLE XII.

The Committee of Publication shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

Every physician making application for membership shall present with his application a paper on some surgical or gynecological subject.

ARTICLE XV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XVI.

No paper read before the Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Committee of Publication.

ARTICLE XVII.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

THIRTEENTH ANNUAL MEETING

OF

THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION,

HELD AT THE

KIMBALL HOUSE,

Atlanta, Ga.,

NOVEMBER 13, 14, AND 15, 1900.

THIRTEENTH ANNUAL MEETING.

The following named members were present:

BAXTER, G. A.	Chattanooga, Tenn.
BOSHER, L. C.	Richmond, Va.
BOVÉE, J. W.	Washington, D. C.
BROWN, G. S.	Birmingham, Ala.
CARTLEDGE, A. M.	Louisville, Ky.
CATHCART, R. S.	Charleston, S. C.
CROW, W. A.	Atlanta, Ga.
DAVIS, J. D. S.	Birmingham, Ala.
DAVIS, W. E. B.	Birmingham, Ala.
EARNEST, J. G.	Atlanta, Ga.
ELKIN, W. A.	Atlanta, Ga.
ENGELMANN, G. J.	Boston, Mass.
EVE, PAUL F.	Nashville, Tenn.
GASTON, J. McFADDEN	Atlanta, Ga.
GLASGOW, F. A.	St. Louis, Mo.
GOGGANS, J. A.	Alexander City, Ala.
HAGGARD, W. D., Jr.	Nashville, Tenn.
HARDON, V. O.	Atlanta, Ga.
HEFLIN, WYATT	Birmingham, Ala.
HOLMES, J. B. S.	Atlanta, Ga.
HUNTER, H. M.	Union Springs, Ala.
JELKS, J. T.	Hot Springs, Ark.
JOHNSTON, GEO. B.	Richmond, Va.
KELLY, HOWARD A.	Baltimore, Md.
KIME, R. R.	Atlanta, Ga.
LONG, J. W.	Salisbury, N. C.
McGANNON, M. C.	Nashville, Tenn.
McMURTRY, LEWIS S.	Louisville, Ky.
McRAE, F. W.	Atlanta, Ga.
MARTIN, E. D.	New Orleans, La.
MERIWETHER, F. T.	Asheville, N. C.
NICOLSON, W. P.	Atlanta, Ga.
NOBLE, GEORGE H.	Atlanta, Ga.
PARHAM, F. W.	New Orleans, La.

PLATT, W. B.	BALTIMORE, MD.
POTTER, W. W.	BUFFALO, N. Y.
POWELL, S. D.	NEW YORK, N. Y.
QUINN, W. A.	HENDERSON, KY.
ROBERTS, W. O.	LOUISVILLE, KY.
RODMAN, W. L.	PHILADELPHIA, PA.
ROGERS, W. B.	MEMPHIS, TENN.
SAUNDERS, BACON	FORT WORTH, TEXAS.
SIMONS, MANNING	CHARLESTON, S. C.
SOUCHON, EDMUND	NEW ORLEANS, LA.
TALLEY, D. F.	BIRMINGHAM, ALA.
TOMPKINS, CHRISTOPHER	RICHMOND, VA.
WATKINS, I. L.,	MONTGOMERY, ALA.
WESTMORELAND, W. F.	ATLANTA, GA.

NEW MEMBERS PRESENT.

BLACK, JAMES M.	KNOXVILLE, TENN.
ELLIS, JAMES M.	ATLANTA, GA.
GASTON, J. MCFADDEN, JR.	ATLANTA, GA.
GOLDSMITH, W. S.	ATLANTA, GA.
HOKE, MICHAEL	ATLANTA, GA.
HORSLEY, J. S.	EL PASO, TEXAS.
LLOYD, SAMUEL	NEW YORK, N. Y.
MACDONALD, W. G.	ALBANY, N. Y.
MANTON, W. P.	DETROIT, MICH.

Letters and messages of regret were received from a number of members who were unable to attend the meeting.

FIRST DAY.—*Tuesday, November* 13, 1900.

Morning Session.—The Association convened in the ball-room of the Kimball Hotel, and was called to order by the President, Dr. A. M. Cartledge, of Louisville, Ky., at 10 A.M.

Governor Chandler, of Georgia, was introduced, and delivered the following

ADDRESS OF WELCOME.

Mr. President and Members of the Southern Surgical and Gynecological Association: At the request of members of your Association who reside in this city I have absented myself for a few minutes for the purpose of extending to you a hearty welcome to the Empire State of the South. Georgia is proud of her medi-

cal profession. We believe that those who represent the profession to which you belong in our State are the peers of the members of that profession in any other State in the American Union. (Applause.) In behalf of the State it affords me great pleasure to welcome you to Georgia—a State which needs no eulogium from me; a State whose history from the time James Oglethorpe landed to this day has illustrated the valor, the intelligence, the enterprise of its citizens—a citizenship which has produced as many men eminent in the learned professions as any other State, and as citizens of such a State we welcome you to-day. We welcome you because the history of this great State has not been made by laymen alone, not by the lawyers within our borders, but because some of Georgia's most illustrious sons have belonged to the profession to which you belong. I have the honor to live in the county which was named after a distinguished physician of Georgia—Lyman Hall, one of the signers of the Declaration of Independence; a man who was first and foremost in the struggle for the achievement of American liberty. (Applause.) That man came from a Northern State and cast his lot with Georgia prior to the dawn of independence, or, rather, prior to the beginning of the struggle for independence. A county adjoining me—the county of Banks—was named after an illustrious Georgia surgeon; a man who crossed the river more than half a century ago; a man who in his day and generation was distinguished for his usefulness, his skill, and his ability as a surgeon. One of the most marked illustrations or instances of rapid political preferment and distinguished usefulness in the history of Georgia is the case of a physician—a man who served his county in both branches of the Legislature of his State, who served his State in the United States House of Representatives, who served his State in the United States Senate, who was the first constitutional Governor of the State of Alabama, who was not a lawyer or a layman, but a physician—William White Bibb—and for whom two counties (one in Alabama and one in Georgia) were named. Georgia has reason to be proud of its surgeons and physicians. We are proud of the record they have made, not only in their profession, but in other fields of usefulness. And, I repeat, I am glad in the name and on behalf of the people of Georgia to welcome this Association to this city. The city is yours while you are here. Take whatever you see, and if

you want anything you do not see, ask for it and it is yours. (Applause.)

The doctors are the best friends of everybody. They get closer to the women and children in the family and closer to the community in which they live than the preacher. Members of families do not tell the preachers some of the things that they are obliged to tell the doctor. The doctor is one of the first friends we have in the world. He is ever ready to welcome our advent into it. He is the first usually to handle us and to turn us over to the nurse and bid us godspeed on our journey through life, and finally, at the close of that journey, he is the last friend to stand beside us and hand us over to the undertaker. (Laughter and applause.)

Gentlemen, in conclusion, I again welcome you in behalf of the State of Georgia, in the name of the people of Georgia. We are glad to have you with us. We are glad that you have honored our State by meeting here. I understand that there are members of your Association present from the Atlantic to the Pacific, from the Lakes to the Gulf, and I beg to assure you that you have the hearty welcome of all of the people of Atlanta and of the State. (Loud applause.)

RESPONSE TO THE ADDRESS OF WELCOME BY PRESIDENT CARTLEDGE.

Gentlemen: I bespeak the sentiments of the members of this Association when I say that we thank the governor of this great State for the kind remarks he has extended to the medical profession, not only of Georgia, which she so richly deserves, but to the medical profession generally. We are always pleased to listen to a layman so distinguished as his excellency the governor—one who has noted the progress of medical men in this country—and it is a source of great satisfaction and gratification to us to hear one recount the great work of illustrious men.

Again, we heartily thank you, Governor Chandler, for the complimentary things you have said about the profession of your own State, which we heartily indorse. (Applause.)

Dr. George H. Noble, Chairman of the Local Committee of Arrangements, made the following verbal report:

REPORT OF THE COMMITTEE OF ARRANGEMENTS.

I have the honor to report, on behalf of the Local Committee of Arrangements, that the members, as they register, will receive a small badge which entitles them to the privileges of the clubs of the city. The following are the names of the city clubs: The Capital City Club, the Colonial Club, the Fulton Club, the Jockey Club, the Piedmont Driving Club, the Athletic Club, etc. This evening, at 8 P.M., there will be a smoker in this hotel. Tomorrow evening at 9 o'clock there will be a reception extended to the members and guests of the Association in this hotel.

On motion, the local members of the medical profession and other visitors were invited to take part in the discussions on papers.

Papers were then read as follows:

1. "Medullary Narcosis," by Dr. W. L. Rodman, of Philadelphia, Pa.

Discussed by Drs. McMurtry, Macdonald, Cartledge, Pierre Mallett, of New York, Beverly MacMonagle, of San Francisco, Powell, Long, and, in closing, by the essayist.

2. "A New Method of Simplifying the Treatment of Complicated Fibroid Uteri and Severe Cases of Pelvic Inflammatory Disease," by Dr. Howard A. Kelly, of Baltimore, Md.

Discussed by Drs. Macdonald, Bovée, Davis (W. E. B.), MacMonagle, Engelmann, H. C. Wyman, and the discussion closed by the essayist.

3. "Report of a Case of Osteofibroma of the Uterus," by Dr. George Ben Johnston, of Richmond, Va.

Discussed by Drs. Kelly and Bovée.

4. "Appendicitis in the Female," by Dr. W. F. McRae, of Atlanta, Ga.

Discussed by Drs. Holmes, Wyman, Kelly, McMurtry, Westmoreland, Rodman, Nicolson, Johnston, and the discussion closed by the essayist.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session.—The Association reassembled at 2.30 P.M., and was called to order by the President.

5. "Drainage in Abdominal Surgery," by Dr. J. W. Long, of Salisbury, N. C.

Discussed by Drs. Simons, Kelly, Davis (W. E. B.), MacMonagle, and, in closing, by the essayist.

6. "A Flap Operation for Atresia of the Vagina, with Illustrations," by Dr. George H. Noble, of Atlanta, Ga.

Discussed by Dr. Kelly.

7. "Recent Technical Improvements in the Surgery of the Stomach for Carcinoma," by Dr. Willis G. Macdonald, of Albany, N. Y.

Discussed by Drs. H. C. Wyman, McRae, and, in closing, by the essayist.

8. "What is the Menstrual Condition of the Average Girl in Average Health?" by Dr. George J. Engelmann, of Boston, Mass.

Discussed by Dr. Earnest.

9. "Operation Devised for the Cure of Marked Rectal Prolapse in Women," by Dr. J. Wesley Bovée, of Washington, D. C.

Discussed by Drs. Johnston, Powell, Kelly, and, in closing, by the essayist.

On motion, the Association adjourned until 9.30 A.M., Wednesday.

SECOND DAY.—*Wednesday, November* 14, 1900.

Morning Session.—The Association met at 9.30 A.M., with the President in the chair.

10. "Carbolic Acid in Surgery," by Dr. Seneca D. Powell, of New York City.

Discussed by Drs. Kelly, Gaston, Jr., Macdonald, Martin, Glasgow, Kime, Jelks, Horsley, Engelmann, Long, Cartledge, Brown, and the discussion closed by the essayist.

11. "Early Excision for Dislocations not Reducible by Manipulation," by Dr. Willis F. Westmoreland, of Atlanta, Ga.

Discussed by Drs. Davis (John D. S.), Souchon, Brown, and Nicolson.

The First Vice-President, Dr. Simons, took the chair, and President Cartledge delivered his address. He selected for his subject "A Plea for the Better Appreciation of the Limitations of Operative Work."

On motion of Dr. W. E. B. Davis, a vote of thanks was extended to Dr. Cartledge for his excellent address.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session.—The Association reassembled at 2.30 P.M., and was called to order by the President.

12. "Exsection of the External Carotid Artery in Inoperable Malignant Disease of the Face, with Report of Cases," by Dr. William P. Nicolson, of Atlanta, Ga.

Discussed by Dr. Parham, and, in closing, by Dr. Nicolson.

13. "Auto intoxication from Renal Insufficiency with and without Disease of the Kidney," by Dr. James T. Jelks, of Hot Springs, Ark.

Discussed by Drs. Campbell, McGannon, and, in closing, by the essayist.

Dr. Pierre Mallett, of New York City, exhibited a ligature passer. Dr. E. D. Martin, of New Orleans, La., also exhibited new instruments.

14. "Pseudomembranous Enteritis and its Relation to Surgery of the Abdomen," by Dr. Frank A. Glasgow, of St. Louis, Mo.

15. "Vesicovaginal Fistula," by Dr. M. C. McGannon, of Nashville, Tenn.

Discussed by Drs. Macdonald and McGannon.

16. "Supplementary Report (*a*) on a Case of Litholapaxy; (*b*) Supplementary Report on a Case of Vesicorectal Fistula," by Dr. George S. Brown, of Birmingham, Ala.

On motion, the Association adjourned until Thursday morning, 9.30 o'clock.

THIRD DAY.—*Thursday, November* 15, 1900.

Morning Session.—The Association met at 9.30 A.M., with Dr. George J. Engelmann, of Boston, in the chair.

17. "Some Life-saving Measures in Obstetric Work, with Cases," by Dr. R. R. Kime, of Atlanta, Ga.

Discussed by Drs. Watkins, Manton, Jelks, and the discussion closed by the essayist.

18. "Removal of Cystic Gallstones," by Dr. Howard A. Kelly, of Baltimore, Md.

Discussed by Drs. Davis (W. E. B.) and Cartledge.

19. "Retroflexed Incarcerated Gravid Uterus," by Dr. Wm. A. Quinn, of Henderson, Ky.

20. "Report of a Case of Solid Ovarian Tumor," by Dr. J. G. Earnest, of Atlanta, Ga.

Discussed by Dr. Hardon, and the discussion closed by the essayist.

21. "Epispadias and Hypospadias, with Special Reference to their Operative Treatment," by Dr. W. F. Parham, of New Orleans, La.

Discussed by Dr. Martin.

22. "Osteo-arthritis of the Spine," by Dr. Michael Hoke, of Atlanta, Ga.

Discussed by Dr. Brown.

The report of the Auditing Committee was presented by Dr. R. R. Kime, who stated that the committee had examined the books of both the Secretary and Treasurer, had found them correct, and accompanied by the proper vouchers, showing a balance in the treasury of $2276.96.

On motion, the report was adopted and filed.

The President called for the report of the Council, which was read by Dr. George Ben Johnston, as follows:

REPORT OF THE COUNCIL.

The Council met at the Kimball House, with Dr. George Ben Johnston in the chair, and Dr. L. S. McMurtry was appointed Secretary.

The Secretary of the Association, Dr. Davis, moved that the Council recommend that Section 1, of Article V., of the Constitution be amended by omitting the last two words, "by nomination."

Also in Section 1, Article VI., omit "to sign the approved proceedings of each meeting."

Also in Section 4, of Article VI., omit the words "by the seal of the Association."

Also in Section 4, Article VI., omit the words "and be Chairman of the Publishing Committee" and insert "and edit the TRANSACTIONS under the direction of the Council."

Also in Section 6 strike out "Committee of Finance" and insert "Auditing Committee." Also strike out "at the next session of the Association" and insert "on the last day of the session."

Also in By-Laws, Article VII., insert for the words "one hundred dollars" the words "two hundred and fifty dollars."

Also in Article VIII. strike out the words "by circular letters."

Also in Article IX. substitute "papers" for "all essays," and also substitute "preliminary program" for "circular letters to the members."

Also that Article XI. read "the President shall appoint at each annual meeting a Committee of Arrangements."

Also in Article XII. for "Committee of Publication" substitute "The Council."

Also strike out Article XIV. and in Article XVI. substitute "Council" for "Committee of Publication."

NEW MEMBERS.

Howard J. Williams, Macon, Ga.
F. F. Simpson, Pittsburg, Pa.
J. Shelton Horsley, El Paso, Texas.
W. S. Goldsmith, Atlanta, Ga.
Samuel C. Benedict, Athens, Ga.
John C. Wysor, Clifton Forge, Va.
J. McFadden Gaston, Jr., Atlanta, Ga.
Michael Hoke, Atlanta, Ga.
Charles M. Reese, Charleston, S. C.
Ennion G. Williams, Richmond, Va.
James M. Black, Knoxville, Tenn.
James N. Ellis, Atlanta, Ga.
Jos. Ransohoff, Cincinnati, Ohio.
Arpad G. Gerster, New York, N. Y.
Roswell Park, Buffalo, N. Y.
J. W. Williams, Baltimore, Md.
Henry T. Byford, Chicago, Ills.
John B. Deaver, Philadelphia, Pa.
W. G. Macdonald, Albany, N. Y.
L. H. Dunning, Indianapolis, Ind.
Miles F. Porter, Fort Wayne, Ind.
Edward J. Ill, Newark, N. J.
Wm. R. Pryor, New York, N. Y.
W. P. Manton, Detroit, Mich.

J. M. Baldy, Philadelphia, Pa.
Hugh Young, Baltimore, Md.
R. T. Morris, New York, N. Y.
Alex. H. Ferguson, Chicago, Ills.
Samuel Lloyd, New York, N. Y.

OFFICERS.

President—Dr. Manning Simons, of Charleston, S. C.

Vice-Presidents—Dr. George H. Noble, of Atlanta, Ga., and Dr. L. C. Bosher, of Richmond, Va.

Secretary (to fill unexpired term)—Dr. W. D. Haggard, Jr., of Nashville, Tenn.

Treasurer—Dr. Floyd W. McRae, of Atlanta, Ga.

For Council—Dr. George J. Engelmann, of Boston, Mass.

Place of Meeting—Richmond, Va.

For Chairman of Committee of Arrangements—Dr. George Ben Johnston.

On motion of Dr. John D. S. Davis, the report of the Council was adopted with the exception of that part pertaining to the Constitution and By-Laws, which must lie over for one year.

President Cartledge appointed Dr. Johnston and Dr. Earnest to escort the newly elected President, Dr. Simons, to the chair.

The retiring President, in introducing his successor, said: It gives me great pleasure to present to you a gentleman who has done so much for the surgery of his own State—which is an extremely Southern one—as I can testify, and a gentleman who has had the interests of this Association at heart since his connection with it. I am sure the honor has been worthily bestowed, and I present to you Dr. Manning Simons, of Charleston. (Applause.)

Dr. Simons, on taking the chair, was warmly received. He spoke as follows:

Fellows of The Southern Surgical and Gynecological Association: I am so much overwhelmed with surprise at my election to the office of President of this Association that I find it scarcely possible to find words which will suitably express my appreciation of the high honor which has been conferred upon me on this occasion. As I glance around this body I cannot fail to be convinced that there are many others among you who are far better qualified than myself to discharge the duties of

this high office, and I am satisfied that there are many of you whose claims are far stronger than mine to be elevated to this position. I feel, therefore, in thanking you for the honor that you have conferred upon me, that I should appreciate the fact that the profession of the State of South Carolina, whom I have the honor on this occasion to represent, have been honored through me by this appointment, and I accept for them as well as for myself the great compliment that has been conferred upon us by this election. (Applause.)

It must be well known to you that the success of this Association from its inception to the present time has been largely due to the enthusiasm and interest that have been manifested by the officers who have been appointed by you to shape the business of the Association. To those Presidents who have preceded me largely belongs the credit for the position that this Association has assumed in the profession of this great country. It can be truly said that until the origin of this Association the people of this country did not know there were any surgeons south of Mason and Dixon's line; there was no source by which the work of these gentlemen could be brought to the notice of their fellows throughout this broad land. To-day it is with great pride that we are able to say that this Association has assumed a high position among the special bodies in this country, and that the TRANSACTIONS of the various meetings that have been held from time to time will compare most favorably with, if they do not quite equal, the works of similar bodies.

While I cannot hope in the next year to accomplish for you the good work that has been done by my predecessors, and especially by the gentleman who has preceded me in this chair, still it will be my effort, so far as my ability will permit me to go, to further the interests of the Association, and to endeavor to keep up those interests which have been kindled by its founders for its success.

On an occasion like this it would be scarcely grateful did I not say that much of the success of the Association is due to the indomitable energy and wonderful organizing power of our distinguished Secretary, Dr. Davis (applause); and while to the presiding officers of the Association is due a meed of praise for the success which has attended the various meetings, we cannot but think that if the ends were not so strongly upheld by our

courteous and able Secretary we would not have reached that meed of success with which our work has been characterized.

Again I thank you for the distinguished honor that has been conferred upon me, and beg to assure you that as far as my limited ability will permit it will be my endeavor to further the interests of the Association so long as I may have the honor to occupy this chair. (Loud applause.)

Dr. Christopher Tompkins, of Richmond, Va.—I would like to say that on behalf of myself and colleagues of Richmond we are particularly gratified that the Association has thought proper to hold its next meeting at Richmond, and I am sure the news will be received with great cordiality and equal gladness by our brethren in Richmond. I hope every member of the Association will be in attendance, for we promise you a warm welcome. You will not only find the latch-string on the outside, but the door will be wide open. (Applause.)

The newly elected Secretary, Dr. W. D. Haggard, Jr., was called upon for a speech. He said: I am such a young member among you that I scarcely feel competent to say all that I really feel about the distinguished honor that has been bestowed upon me so unworthily. I am especially proud of this distinction inasmuch as the destiny of the Association has been so warmly fostered by my father, who regrets very much his inability to be present upon this occasion. It is indeed a great honor to have thrust upon my shoulders the work that has been carried on so ably, efficiently, and successfully by his *confrère* in the foundation of the Association—Dr. Davis. I have had the misfortune, I might say, hitherto of being Secretary of almost all of the bodies to which I have belonged, but never before have I felt so keenly my complete unworthiness. However, with the fraternal assistance of my very dear friend, Dr. Davis, I may hope in some measure to reflect his own able efforts for the success of this Association (Applause.)

Dr. George J. Engelmann, of Boston.—By the vote we have just cast the Association enters upon a new era. Let us remember that our Secretary and our guide has resigned as the Secretary of this Association, and it is eminently fitting that we should give expression to our regrets by introducing and adopting appropriate resolutions. I therefore move you, sir, that Dr. George Ben Johnston be requested to draft resolutions expressing our sentiments of the efficient services that have been

rendered by the retiring Secretary, Dr. Davis, and that these resolutions be prepared in time to appear in the forthcoming volume of TRANSACTIONS. Seconded and carried.

Resolved, That in the resignation of Dr. W. E. B. Davis as Secretary, we lose an officer who was a founder and one of the principal promoters of this Association, it being largely due to his energy and zeal that this Society has attained its present elevated position.

We part with him with regret, and tender him our good-will and best wishes for his future welfare. GEORGE BEN JOHNSTON.

Dr. Engelmann moved that the thanks of the Association be extended to His Excellency, Governor Chandler, of Georgia; to the medical profession of Atlanta, for their gracious hospitality; to the Committee of Arrangements for many courtesies extended; to the Kimball House, and to the Southern Passenger Association for reduced rates. Seconded and carried.

After several calls for a speech from the retiring Secretary, Dr. Davis arose and said:

Mr. President and Members of the Association: It is kind of you to indulge me in this way and to show such appreciation of the feeble efforts I have made in behalf of the Association.

Some fourteen years ago the South was scarcely recognized in the medical world. The following surgeons and gynecologists from this section comprise the few who had been honored with membership in the national special societies: Yandell, of Kentucky; Battey, Campbell, and Westmoreland, of Georgia; Briggs and Maury, of Tennessee; McGuire, of Virginia; Kinloch, of South Carolina; Gregory, Mudd, and Engelmann, of Missouri; Richardson and Logan, of Louisiana; Mastin, of Alabama, and possibly a few others whose names do not occur to me at this time. Our Southern country was not shown the consideration that it deserved; our men were doing excellent, practical surgical work—as good as was being done anywhere—and yet they were not given an opportunity to show it. This Association was therefore organized to bring these men to the front, to do missionary work in the South, and as a result we find now that a large number of the good men of the South—those who have done original work, those who have done practical, valuable work—are not only members of this Association, but are also members of one of the national societies.

This Association has grown and expanded until it is only a

Southern association in name. It is a national organization in every sense of the word, with the exception that its meetings are held in the South and its officers are Southern men. In its organization sectionalism was not thought of: it was to bring these men to the front, to make them known, to give them an opportunity to report their work; and I want to say that so much of this work has not been due to the Secretary of the Association as you are led to believe. It has been due to the fact that Southern men wanted the association, and they exerted themselves to make it an association worthy of a land hallowed by the footprints of McDowell, Sims, and Paul F. Eve. No Secretary or President could make an association like this; it must be accomplished by the men composing it.

It is a source of great pride to me to see the position that it holds in the medical world. Its TRANSACTIONS are not only quoted in this country, but abroad. It has in its membership men whose writings are prized wherever medical literature is known. This means much for a section whose medical literature amounted to almost nothing fourteen years ago.

I want to say, in conclusion, that I feel especially gratified to have the son of a man who has done so much for this Association succeed me as Secretary. It may be unknown to many of you that Dr. W. D. Haggard, Sr., did more than any other member in the infancy of this organization, and while he has not been so active in later years, yet to his services do we owe much of the success and high standing of the Association. I am glad to have this opportunity to speak of the valuable services he has rendered the Association, and I congratulate you on having selected so scholarly, so ambitious, and so worthy a man for your Secretary as Dr. W. D. Haggard, Jr. (Loud applause.)

On motion of Dr. Noble, a vote of thanks was extended to the retiring President for the able and efficient manner in which he had conducted the meeting.

The following papers were read by title:

"Cases of Anæsthesia by Intraspinal Injection of Cocaine," by Dr. E. D. Fenner, of New Orleans, La.

"The Open Treatment in Suppurating Forms of Appendicitis," by Dr. Joseph Price, of Philadelphia, Pa.

"Transperitoneal Drainage," by Dr. Lewis S. McMurtry, of Louisville, Ky.

"Aneurism of the Abdominal Aorta (Cœliac Portion); Laparotomy; Isolation of Sac and Wiring with Twelve Feet of Silver Wire; Electrolysis Four and One-half Hours; Death on Nineteenth Day; with Remarks," by Dr. Rudolph Matas, of New Orleans, La.

"Tuberculosis of the Female Pelvic Organs, and their Treatment," by Dr. Joseph Taber Johnson, of Washington, D. C.

"An Operation for Rectal Stricture," by Dr. L. M. Tiffany, of Baltimore, Md.

"Gastro-enterostomy," by Dr. Frank T. Meriwether, of Asheville, N. C.

"A Study of Intracranial Lesions," by Dr. Hugh M. Taylor, of Richmond, Va.

"Fracture of the Shaft of the Humerus Complicated with Dislocation," by Dr. N. P. Dandridge, of Cincinnati, Ohio.

"Value of Therapeutic Tests in Two Cases of Syphiloma Resembling Osteosarcoma," by Dr. W. E. Parker, of New Orleans, La.

"Limitation in Abdominal Surgery," by Dr. T. J. Crofford, of Memphis, Tenn.

"Surgical Treatment Immediately Following Labor, with Report of Cases," by Dr. W. L. Robinson, of Danville, Va.

"Three Cases of Extra-uterine Pregnancy," by Dr. W. B. Dorsett, of St. Louis, Mo.

"Report of a Case of Abdominal Pregnancy, with Specimen," by Dr. R. B. Rhett, Jr., of Charleston, S. C.

"The Surgery of the Gasserian Ganglion," by Dr. Wallace Neff, of Washington, D. C.

"Resection Through the Vagina of Carcinoma Recti," by Dr. J. B. Murphy, of Chicago.

"Traumatic Gangrene," by Dr. J. B. Murfree, of Murfreesboro, Tenn.

"True Conservatism in the Management of Uterine Fibroids," by Dr. Samuel E. Milliken, of Dallas, Texas.

"Coxa Vara, with Report of Two Cases," by Dr. E. D. Fenner, of New Orleans, La.

On motion, the Association then adjourned, to meet in Richmond, Virginia, on the second Tuesday in November, 1901.

W. E. B. DAVIS,
Secretary.

ANNUAL ADDRESS OF THE PRESIDENT.

A PLEA FOR THE BETTER APPRECIATION OF THE LIMITATIONS OF OUR OPERATIVE WORK.

By A. Morgan Cartledge, M.D.,
Louisville, Ky.

At the outset permit me to say that I fully recognize the risk of criticism one incurs in attempting to define rules for the guidance of the many in a question of such magnitude as the title of this paper embraces. Every surgeon must be his own arbiter in deciding such questions, and the judgment he displays will depend upon his professional learning and wisdom; yet we are at times led to believe that some otherwise brilliant surgeons are masters in nearly everything connected with our science and art except this very important point. There are many reasons for this. Our advance has been so rapid and the conquest of disputed fields so dazzling that it is natural in some instances that an unwarranted enthusiasm should be developed. Again, short-cut roads to diagnosis are responsible for many unjustifiable surgical operations.

The methods of surgical diagnosis have undergone striking modifications within the past decade and have curiously influenced operative work. The older surgeon made his diagnosis of abdominal and pelvic lesions slowly, the accuracy of such diagnosis depending largely upon his skill, which skill at that time consisted of a delicate sense of touch, trained eyes to detect asymmetry, keen ears to differentiate sounds elicited by percussion, and methodical investigation of all

symptoms, both subjective and objective. The result was, his diagnosis having been made, he next carefully and with abundant time before him considered the advisability of operative intervention. It is true he often found, after exploration, his most cherished diagnosis a fancy; but where the conditions did coincide with his carefully arrived at conclusions he was in position to bring the best judgment to bear in his operative methods. Later, when evolution in surgical diagnosis reached the stage where greater accuracy was demanded, the exploratory incision for diagnostic purposes was inaugurated. The result was that the finer arts, which constituted the personal skill of the older surgeon in diagnosis, from disuse have fallen into atrophy, and I am sorry to say that with some men seem to have been lost, or, more correctly stated, never have been gained.

Diagnoses made thus rapidly and more accurately had one drawback, in that the revelation was so sudden as to place the surgeon in the position where he must decide the question of operative limitation quickly and without the judgment which sometimes comes with more deliberate thought. That this necessity for quick decision has developed rapid mental deduction from a given abdominal condition is attested by the brilliant work of abdominal surgeons in every part of the world to-day; that it also leads to transgression of surgical limitations or possibilities is one of the purposes of this paper to show. Asepsis, by removing the greatest danger in operations, has led to some unwarranted operations which have been little short of unreasonable experiments. It is as much a part of the knowledge of surgery to know its limitations, or what it cannot do, as to be justly proud and ready to perform that which it has very good reasons to believe will be productive of relief and cure to the thousands of unfortunates who seek its aid. From every stand-point there is much to be gained by a better appreciation of our operative limitations. It is poor balm to our wounded pride, and poor solace to the departed one's friends, for us to say: "Well, he or she would have died anyway from the disease

in a short time." We should remember that while ours is not an exact science it is daily becoming nearer one, and the people, or what we are pleased to call the laity, setting the standard by our brilliant achievements of recent years, practically consider it so now. If we cannot do good, let us avoid doing harm, is a good rule to guide us in performing surgical operations.

It is not to be inferred that carefully planned work coming under the usual head of experimentation should never be undertaken, for without such originality and boldness in the past we would not enjoy the wonderful achievements of our science to-day.

We would plead for more careful diagnoses with an especial view to the detection of attending visceral disease; in short, to try and become more expert prognosticians. There are two phases of surgical practice alone the careful observance of which would reduce the mortality of surgical operations so low as to cause us to believe that exactness had almost been reached. I refer to greater care in the detection of kidney lesions and the institution of measures to correct this frequent cause of unfortunate operative terminations; and, second, the still prevalent practice of operating upon hopeless cancer cases. We cannot honestly place the disastrous terminations from these operations in the category of accidental, unforeseen, and unavoidable happenings. I venture the assertion that there is not in this audience a surgeon who, if he reviews his mortality for the past two years, will not find that 50 per cent. of such mortality was from causes that he should have averted either by displaying the excellent judgment not to have operated upon inoperable cases or by dereliction in not preparing against a weak point prior to operation. We all detest a surgeon who would operate in selected cases, avoiding risk to save his reputation—he does not deserve the name of surgeon—but we can go too far in the other direction, and in our enthusiasm to relieve humanity give too many so-called "only chances" which as often prove to be "last chances."

In reviewing the field of abdominal and pelvic surgery it would seem that surgical limitation is most often exceeded and mortality unnecessarily increased in operations for the following diseases: General septic peritonitis, extensive carcinoma of the ovaries, uterus, and intestines, and operations upon the gall passages in long-continued and profound cholemic patients without adequate preparation.

I beg your indulgence for what may seem a protest against the too frequent practice of operating in these affections. We have every reason to believe that the advocacy of laparotomy in general septic peritonitis by those high in authority in abdominal and pelvic surgery has led to the performance of this operation by those of less experience in utterly hopeless cases of the disease. It is easier for the experienced surgeon to say at the bedside that a given case is hopeless from any line of treatment or is a justifiable one for operation than to describe on paper or by means of discussion the differential points which should determine action. Every man's experience will ever remain his most impressive guide, and certainly those with little experience in operations for general septic peritonitis must either be impressed with the teachings of those in authority and who have had experience or their early work will be fraught with a high mortality in this class of cases. I am not prepared to say that cases of general diffused septic peritonitis have not been saved by laparotomy, irrigation, and drainage—the reports of such cases certainly have appeared in our literature from time to time—but I am prepared to say that up to the present the mortality of such operations in exaggerated types of the disease is so great as to make it an unwarranted procedure. I am strongly impressed with the belief that the successful cases reported have been cases of beginning general peritonitis or of wide-extending yet circumscribed peritonitis. We all know the difficulties that sometimes attend the recognition of the extent of the lesion. Given a case where a focus of virulent infection has suddenly emptied its contents into the peritoneal sac at some point, be it the appendix,

a septic tube, or intestinal lesion, if the sepsis has rapidly augmented, spreading to the entire peritoneal covering, characterized by no adhesion of limitation, manifesting itself objectively by a pulse-rate of 140 to 160, great abdominal distention, paresis of the intestine from toxæmia and gas which precludes the possibility of attaining results from purgation, and the destruction of abdominal breathing, I do not believe that any surgical operation which has for its purpose the administration of an anæsthetic and opening of the peritoneal cavity, with its subsequent drainage, can be other than productive of the greatest harm and hasten the usual disastrous termination.

In reply to the argument which may be made that if two such cases out of a hundred can be saved by this procedure it would still be justifiable, I would say that a painstaking observation of a great number of these patients has led me to believe that probably 5 per cent. would be saved by nature, aided by such measures as sustaining the patient's heart, the free use of saline infusions, etc. Of course, we recognize that the question will ever arise as to the accuracy of the diagnosis ; and here, again, I must say that we have our experience at the bedside to assist us in this decision—but of one thing we feel sure, that we have all in the past operated upon many of these cases that were hopeless from any operative procedure; that we have thus swelled our mortality list and to that extent have brought surgery into disrepute.

Much might be said by way of elaboration in differentiating the operable and inoperable cases of septic peritonitis. Certainly we are often able to save patients with a beginning diffuse septic peritonitis, and it is in distinguishing how far the case has advanced, whether it has transgressed the operative stage or not, that our wisdom is asked to decide.

It seems pertinent to suggest that in general septic peritonitis we should pay especial attention, in deciding for or against operation, to the following points: The duration of the disease and the condition of the intestinal tone. Cases

of diffuse septic peritonitis of more than eighteen hours' duration do not promise any relief from operation. Cases of diffuse septic peritonitis where careful auscultation and other tests show that the vermicular action of the bowel has been lost promise nothing from operation.

I have found a most excellent working rule in these cases to be that if we cannot move the bowels before operation in cases of diffuse peritonitis we will never be able to move them afterward.

It would seem opportune for us to institute a careful scrutiny of our work in the fields of uterine, ovarian, and intestinal carcinoma. These, especially the former, constitute a large part of the work that we are called upon to do, and while a paper dealing thus generally does not permit of going into detail with this particular subject, certainly we have exceeded our surgical limitations in operating upon inoperable cases of cancer, especially of the uterus. Without we approve of removing the uterus for cancer as a palliative measure, which is of doubtful propriety, there are few cases of uterine carcinoma where by radical operation we can hold out any promise of non-recurrence to the patient. There will probably be a time when we will see a larger percentage of so-called favorable cases, then the results of operative intervention will be more promising; but I am sorry to say the practice in many quarters of removing carcinomatous uteri where the disease has extended widely into the pelvis, the pelvic glands, and frequently to both the bladder and rectum, can have but one effect, if we are honest in our statistics, and that is to increase our mortality unnecessarily, for there must be a mortality in these cases, though it be small.

The same is true of attempts at removal of double ovarian carcinoma where the broad ligaments and frequently the peritoneum are involved. It seems that many of these patients could be spared even the minor danger of exploration if we would exercise greater care in our methods of diagnosis.

Perfect scientific honesty demands that we should pursue but one general plan in deciding upon an operation for carcinoma situated anywhere in the body, and that is if it be not possible to extirpate it entirely and radically not to attempt radical operation at all.

Before closing these desultory remarks I wish to impress again upon the members of this Association the great importance, as a means to lessen mortality, of carefully preparing cholemic patients before subjecting them to operation. We all know what undesirable surgical subjects patients suffering from long-continued and profound jaundice are. We are not warranted in subjecting these patients, whose kidneys and oftentimes hearts have become diseased from long-continued circulation of bile in the blood, to an operation until we have instituted measures now in our possession which gradually relieve these complications and increase the chances of their recovery fully 50 per cent. I refer in this connection to the systematic use of the normal salt solution for a period varying from one to three weeks prior to operation.

Another class of cases amenable to the same course of preliminary treatment are cases of inefficient renal action. We are not justified in performing a serious surgical operation upon a patient with impaired kidney action if there is time first to overcome such deficiency by the use of salt solution beforehand. The observance of this practice would in our entire surgical work probably reduce the mortality very close to 1 per cent.

While I have probably told you nothing new, and nothing that you did not already know, if I have succeeded in impressing you with the observance of some points in practice that have seemed to me to be places which need mending and which will do most to lessen mortality, I will feel that the effort has not been in vain.

MEDULLARY NARCOSIS.

By W. L. Rodman, M.D.,
Philadelphia, Pa.

The recent publication of a complete and classical review of the subject of regional anæsthesia by a distinguished member of this Association, Professor Matas, would make it a work of supererogation in me to go at all into the history and literature of the subject of subarachnoid injection of cocaine and other agents. The ground has been so thoroughly covered in the paper referred to that anyone else must necessarily repeat what has already been said in the best possible way. I have, therefore, decided to write only a short paper simply for the purpose of introducing this important subject for general discussion, knowing that many here have used it and possibly have not yet published their experience.

There are certain practical details that we are all interested in, and upon only a few of them have opinions as yet crystallized. I shall, therefore, take up the points of most practical value and briefly discuss them.

1. Will medullary narcosis displace ether and chloroform in operations below the diaphragm? No one, I take it, however optimistic he may be concerning this new method of producing analgesia, could think for a moment of abandoning ether and chloroform. I myself am firm in the conviction that these trusted agents will continue to enjoy our confidence, and that the Corning-Bier method will be held in reserve for certain cases where there is seemingly a clear contraindication to chloroform and ether. Knowing the dangers of these agents we have for years wished for some-

thing else to use in their stead upon certain occasions. Ether is clearly contraindicated in old people with bronchial, pulmonary, and renal disease. It is also unsafe in conditions of arterio-sclerosis. Chloroform is decidedly unsafe in fatty, dilated, or weak heart from any cause; and while valvular disease is not so positive a contraindication to its use, all of us feel uneasy when compelled to administer it in such conditions. Have we in medullary narcosis a safe channel between Charybdis and Scylla? After carefully reviewing all reported cases to date, with my own limited experience I am led to think that while safer in the conditions we have mentioned than ether and chloroform there is still some danger in the new method. So the channel is only a better one—not perfectly safe. It will take the experience of another year at least to set us right and teach us better than we now know the exact status it is to fill in general surgical work.

2. It should, then, be given to subjects suffering from bronchial, pulmonary, and renal diseases; to patients affected with fatty or dilated heart and cardiac diseases in general. It may also, in my judgment, be given to old people where the shock of general anæsthesia is oftentimes so great, and from its action in one case I believe it to be safer than either chloroform or ether in drunkards.

3. The place where the spinal canal is entered is of some importance. Tuffier, Murphy, Matas, and others having the largest experience with this treatment have preferred the fourth lumbar interspace. Any of the lumbar spaces can be punctured with safety, the fifth interspace between the last lumbar and the first sacral vertebra being in some respects the easiest route. We should always remember that the spinal cord proper terminates at the first lumbar vertebra, so that in puncturing below this point we stand in danger of injuring only the cauda equina and not the spinal cord itself. While Tait and Caglieri have found the sixth cervical interspace an available and satisfactory route, I should hesitate to puncture so near the medulla. Furthermore, the reports of Tait and Caglieri lead one to believe that the anæsthesia is

far less complete and satisfactory than when low puncture is made.

4. Under this heading we will consider the primary dangers of simple puncture without injection. Since 1890, when Quincke first demonstrated the feasibility of withdrawing cerebro-spinal fluid by lumbar puncture, it has been done in hundreds, nay, thousands, of cases. Even when done for diagnostic purposes there is a certain amount of danger, as by so doing the nice balance and perfect equilibrium which normally exist between such delicate structures as the brain and spinal cord with their membranes and fluid is, for the nonce, interfered with. A small number of such cases have died immediately or so quickly that death could not have been due to other causes. Bier himself had very unpleasant symptoms after simple puncture in his own person. Having escaped the immediate dangers of puncture for diagnostic purposes, viz., shock, asphyxia, etc., such after-symptoms as nausea, headache, delirium, and insomnia have usually passed away, leaving no unpleasant symptoms behind.

5. It has not been shown that secondary changes, either inflammatory or degenerative, have taken place in either membranes or cord leading to chronic disease. Theoretically one might fear some form of sclerosis. Considerably more operative work has been done upon the brain than on the spinal cord, and we naturally infer that what results from traumatisms of the former may occur in injuries to the latter. The brain and its membranes are very tolerant of operative interference, and it has not been shown that persons thus treated are more subject than others to cerebral affections. We are, therefore, in a measure justified in assuming that simple puncture of the spinal cord, if aseptically done, is unlikely to be followed by serious changes in the cord or its membranes.

6. If we add to simple puncture the injection of some chemical substance by which anæsthesia is produced a new element of danger is undoubtedly added; therefore, the choice of a local anæsthetic becomes of paramount impor-

tance. It has been shown that anæsthesia will follow the injection of many agents into the spinal canal. Cocaine, however, has been used far more than all other substances combined. We know, at the outset, that this agent—the most certain of all in its anæsthetic effect—is difficult to sterilize, as it cannot be boiled without impairing its anæsthetic properties. Raised to a temperature above 180° F. it is decomposed into ecgonin and becomes comparatively inert. Some, however, think it can be boiled and then introduced into the spinal canal without impairing its anæsthetic properties. By raising it to a temperature of 180° F. and repeating this twice, thrice, or even six times, as recommended by Tuffier, it should be sterile and, therefore, safe. Eucaine can be boiled, and on theoretical grounds has been preferred by a few. In the hands of nearly all who have used it, it has been in a measure disappointing and has not taken the place of the more reliable agent, cocaine. Antipyrine, nirvanine, morphine, etc., have also been used with only reasonably satisfactory results.

7. The dose or amount injected is of the very greatest importance. Bier and Tuffier began by using 30 minims of a 2 per cent. solution of cocaine. Both have found this dose too large and likely to be followed by marked symptoms, such as shock, collapse, free diaphoresis, nausea, rapid pulse, embarrassed respiration, and so on. They both now look upon this as a maximum dose, recommending half the amount, or about one-third of a grain of cocaine, as the usual dose. The concentration of the solution is also of importance, as it would seem that a small dose of a 2 per cent. solution is better than a larger dose in greater dilution. I have reduced the number of minims of a 2 per cent. solution each time I have practised this method, and thus far have not failed to get complete analgesia. I first injected 18 minims, in my second patient 17, in the next 16, and hope to reduce the amount to 10 minims. In my judgment this is of great importance, as we should aim to get complete anæsthesia with the smallest amount of the drug.

8. The primary and secondary effects of an injection of cocaine into the spinal canal are those of simple puncture exaggerated. Shock is increased; headache, restlessness, delirium, and other symptoms are necessarily more pronounced. Tuffier lost one patient in 125 operations, death taking place quickly from asphyxia. Roumanian surgeons, with whom this new method has had extensive trial, look upon it with misgivings, as several deaths (at least two) have occurred as the result of spinal cocainization. This much is certain, primary danger, while not great, still exists, as a limited number of cases will die from asphyxia, shock, etc. We are, too, already hearing something from pathologists and specialists in nervous diseases about the possible scleroses of the cord that may follow this method of treatment. It remains to be seen whether their forebodings are justified. I cannot think that the simple introduction of a sterile fluid will increase what might be called the secondary dangers, and they will probably be no more frequent than has been encountered after simple puncture for diagnostic purposes. Experiments upon dogs and other lower animals bear out this view, as they have been killed long after the injection and their spinal cords and membranes carefully studied for histopathological changes, with negative results always.

9. How shall we sterilize the agent chosen to produce anæsthesia? No substance should be chosen that cannot be either boiled or raised to such a high temperature as to destroy ordinary pathogenic organisms. Chemical disinfection is out of the question.

10. The method of injection is also of great importance. The fluid should be thrown in very slowly, at least one minute being consumed. It is, moreover, advised by nearly all that the needle be kept in position two minutes longer. This was first insisted upon Bier, and the injunction has been since repeated by Tuffier and others. This is done to prevent the cerebro-spinal fluid from flowing out at the point of puncture before complete distribution of the cocaine has taken place and its absorption at least partially advanced.

The fluid should be injected warm, which is easily arranged by putting the ampullæ in warm water for a few minutes before use.

11. The length, size, shape, and composition of the needle are of great importance. It should be at least three inches long, of small diameter, with a very sharp point and short bevel. If the bevel is long the fluid may escape into the extradural space. The best needle is made of a composition of iridium and platinum. Steel is more likely to break and rust (inside and out), and it cannot be sterilized in a flame. The irido-platinum needle can be sterilized in an open flame, does not bend too much and yet enough, and is not easily broken. The syringe should be entirely of glass, so that it can be boiled. Its transparency makes it superior to metal, enabling the surgeon to see whether or not the fluid is being introduced.

12. *Technique.* The patient is first blindfolded and his ears filled with cotton to avoid psychic pain. The operative field should be treated in the most approved aseptic and antiseptic way before spinal puncture is undertaken—not only the point of puncture, but every part of the back that the surgeon's hands may accidentally come in contact with. The patient should be in the sitting position. The spine of the fourth lumbar vertebra being located, the thumb of the left hand is placed there. This may always be recognized by a line drawn from the crests of the ilia, which will pass through the spinous process of the fourth lumbar vertebra. The patient is asked to bend forward, placing the hands on the thighs, or folding his arms, or assuming an exaggerated "scorching position." By this means the interspace is increased very much and the passage of the needle between the laminæ greatly facilitated. It traverses, of course, skin cellular tissue, lumborum muscles, and meninges. The puncture is made either to the right or left of the spinous process, one-third of an inch either to the right or left of the median line being the point of election. The surgeon soon recognizes by the lessened resistance in front that the point

of the needle is in a cavity and usually he will be made certain of its position by the escape of cerebro-spinal fluid, drop by drop. The injection should never be made until this positive assurance is had. If the operator is sure that the needle is in place, and yet spinal fluid does not escape, he may attach the syringe and gently aspirate, in this way starting the fluid. Of course, perfect anæsthesia will not follow if the injection be made before the escape of cerebro-spinal fluid. The needle having entered the subarachnoid space, as evidenced by the escape of its fluid, the cocaine should now be slowly injected at a temperature similar to that of the blood or normal cerebro-spinal fluid, as less shock will be given by so doing. After three minutes from the beginning of the injection the needle is withdrawn and the puncture immediately covered with iodoform collodion. The iodoform used should be crystals (never the powder) which have been sterilized in 1 : 500 bichloride of mercury. A pad of sterile gauze is placed over this and secured by adhesive strips. Anæsthesia will be complete nearly always in ten minutes, sometimes as early as five or six, rarely as late as fifteen.

DISCUSSION.

Dr. Lewis S. McMurtry, of Louisville, Ky.—Mr. President: The essayist has presented a subject which is now attracting a great deal of attention on the part of the medical profession. I think it is very fortunate that the subject has been presented before this body in such a thorough, conservative, and practical manner. I wish to emphasize the position he has taken, and would suggest that in the discussion it be borne in mind that the essayist does not predict that this method will take the place of the established methods of anæsthesia, but that he assigns to it a limited and useful place in surgery, which I think is the correct view to take. I think the profession, considering the interest it exhibits toward a subject like this, can be divided into two classes. Dr. Skillman, of Lexington, Ky., told me that he was present the first time that chloroform or ether was

administered in Lexington, in the practice of the late Dr. Benjamin W. Dudley, then the foremost surgeon of that section of the country. Ether was administered by Dr. Bush, his assistant, for some operation. Dr. Dudley was very much displeased with it. He did not think it would come into general use. He did not think it would amount to anything, and so far as his practice was concerned it would be an absolute disadvantage. He wanted the patient to suffer, because by so doing it mechanically aided him in the performance of the operation and indicated the extent to which it could be carried, etc. This is an illustration of one extreme in our profession where a novelty of any kind may turn out to be one of the great epoch-makers in the advance of medicine and surgery and how it may be regarded by a great mind who is averse to making any change in the methods he has adopted.

The other class into which the profession can be divided is that large class which is disposed to adopt every novelty that is introduced, to become enthusiastic about it at once, and to claim for it a scope of use that is entirely unwarranted. I have no right to discuss this subject from the stand-point of personal experience, because I have had no experience with it. However, the method has been used in our city, I believe, by only Dr. Cartledge and Dr. Bullitt, who made a report on it at a recent meeting of the Louisville Surgical Society, and their observations are in line with those reported by the essayist, Matas, Murphy, and others who have used it in this country. Dr. Rodman has indicated exactly what this innovation will do. There is a certain class of cases in which it is indicated, while in others it is positively contraindicated. However, it may be applicable to and doubtless will be found serviceable in a limited number of cases; but the established means of anæsthesia are safer than they have ever been, because it is only recently that surgeons have recognized that it is an art to administer ether and chloroform, and that the administration of these drugs should be placed in the hands of those who are capable and who have been trained to handle them in connection with major surgical operations. Great injustice has been done to these agents by having them administered by anybody and everybody. Too frequently these anæsthetics are given by inexperienced physicians and nurses, and even by laymen, and

when we consider these facts and the safety of existing methods of anæsthesia it is certainly most remarkable. When we place the administration of an anæsthetic in the hands of an experienced and well-trained anæsthetizer we have a degree of safety that is almost equal to any degree of perfection which can be attained by any therapeutic agent. It is true that accidents occasionally occur under most capable hands, but considering the extent to which chloroform and ether are used it is really remarkable that there are not more accidents or fatalities.

In adopting medullary narcosis or anæsthesia I should say it requires greater care in technique than in administering ether or chloroform. The latter agents introduced into the system are eliminated from it by natural routes, no traumatism whatever being done. In this method the technique required is more complicated, and the possibilities of danger are not to be lost sight of from the fact that it has been used by surgeons of skill and with great care. Doubtless, if this new method comes into general use and is placed in the hands of those who are not accustomed to do surgery, the technique of its administration will not be so closely followed and disastrous results may occur.

I have simply risen to say that the subject is one of great importance, and I wish to indorse the spirit in which the paper has been presented. It is conservative and judicial, and while I desire to emphasize the fact that its scope is limited, yet it is destined to be of a great deal of value.

Dr. Willis G. Macdonald, of Albany, N. Y.—My experience in relation to the use of cocaine in this way is very limited and my personal experience has been confined to one case. The patient was a man, aged forty-four years, who suffered from hemorrhoids and fissure of the rectum. He had always been a very hard drinker or pronounced alcoholic. Prior to the time of operation both granular and hyaline casts were found in the urine, with a small amount of albumin and generally deficient urinary secretion. He also had a fatty, dilated heart. I had just returned from Europe and had seen Professor Kocher use this method of anæsthesia in his clinic, and while it did not appeal to me as being a satisfactory method of anæsthesia and was associated with mental anxiety to the surgeon while he was operating, yet this seemed to be a case in

which I could employ the method. Therefore, following practically the technique of Dr. Rodman, I injected 18 minims of a 2 per cent. solution of cocaine, withdrawing the needle after three minutes, placed the patient in the lithotomy position, sat down at the foot of the table, and was about to proceed with the enucleation of the hemorrhoid, when my assistant said to me: "This man's pulse is not right; it is faster than it should be." I asked the house-surgeon to count the patient's pulse, and at that time it was 150. The man became cyanotic; he had a profuse, cold perspiration, and I stopped to see what could be done before continuing the operation. The patient was given one-twentieth of a grain of strychnine and one-twenty-fifth of a grain of nitroglycerin, shortly after which the respirations ran up to 60 or 80. No pulse could be found at the wrist. The pupils became dilated and he became unconscious. He was given a saline infusion and I was compelled to remain with him. He was on the table an hour and a half without any operation having been done, and I did not feel safe about his condition for more than two hours. He did not recover from the effects of the injection of cocaine until late that evening, and then he did not get back to anything like the usual condition. He suffered severely during the entire afternoon from headache and projectile vomiting. He had some two or three involuntary movements of the bowels, and his condition was very serious. Two days afterward I gave him nitrous oxide and ether and operated on the hemorrhoids, from which he recovered.

I was present at Professor Kocher's clinic when he had a similar experience, although not so severe. Had it been more serious in my case I should hesitate very much to inject cocaine into any man's subdural space.

Dr. Kelly.—What strength of cocaine did Professor Kocher use?

Dr. Macdonald.—I believe he used one-half of 1 per cent. in a normal solution, and used 10 c.c. I said to my patient: "I am about to employ in your case a new method of anæsthesia which has been successfully used." I said nothing to him about the safety of the procedure. I did not ask his permission to use it, but said I was going to use it. This man came very near dying, and nothing but the most active treatment under the best conditions saved him.

There is a medico-legal aspect to this question. Had he died a suit might have been brought against the hospital or against me personally, and I am not sure how good a defence I would have or what position I should take, and I may say to you that I will never employ it again without the absolute consent of the patient upon whom I use it.

Dr. A. M. Cartledge, of Louisville, Ky.—My experience has been limited to eight cases up to the present time. It has been similar to that which you have heard. There was a severe headache complained of by two patients following its use. The other patient got along very well. Nausea has been present in but one case. It occurred with regularity about twenty or twenty-two minutes after the injection. There is very little nausea while the patient is on the table. The analgesia was all that could be desired. One patient, a very nervous woman, from whom I removed pus-tubes, knew what was going on. She complained a little afterward, but felt no pain. I removed a large fibroid from one patient by this method of anæsthesia, also a large intraligamentous cyst, and did a hysterectomy. Some of the patients came off the table better than they would have done under chloroform or ether. We have had no unpleasant reports such as we have heard from Dr. Macdonald.

Dr. J. Wesley Bovée, of Washington, D. C.—We have with us a gentleman who has had some experience with this new method of anæsthesia, and I am sure the Association will be glad to hear from him.

Dr. E. Pierre Mallett, of New York, N. Y.—Mr. President and gentlemen: I had no idea of making any remarks on this subject, as my experience is very limited indeed, but as your President has expressly asked for *unfavorable* experiences with this method I feel that I ought to report them. The cases I mention were operated upon by Dr. E. H. Grandin, myself assisting. If I had attempted to produce the anæsthesia by this method myself I should have at once concluded that my technique was at fault; but as that part of the operation was performed by Dr. Simon Marx, with his own instrument and especially prepared solution of cocaine, these failures could not be attributed to faulty technique.

The first case was one of abdominal section for retroverted,

adherent uterus. Considerable difficulty was experienced in puncturing the canal, the needle being withdrawn several times and reinserted, during which time the patient complained considerably. After repeated efforts the canal was entered and the spinal fluid began to flow from the needle. The injections of the cocaine solution were then made. At the end of fifteen minutes a slight degree of anæsthesia was shown. At the end of eighteen minutes the skin was apparently anæsthetic, as was evidenced by the prick of a pin in different portions of the body, and we decided to go ahead with the operation.

An incision in the median line was rapidly made through the skin and fascia almost down to the peritoneum. The patient made a great outcry and was with difficulty held on the table. After waiting a short time longer another attempt was made to get down to the peritoneum, but it seemed to cause so much pain that it was impossible to proceed. The patient was then given chloroform and the operation completed.

The second case was a posterior vaginal section for pelvic abscess. In this case the needle was introduced into the canal at the first attempt and with very little apparent pain. In from fifteen to eighteen minutes the skin about the labia and the lower extremities seemed to be anæsthetic and the operation was commenced.

On puncturing the post-cul-de-sac the patient showed every evidence of great pain and had to be held on the table while the operation was rapidly completed. The same phenomena as has been described by Dr. Rodman—slight nausea, etc.—followed in each case.

The subsequent histories of these two cases were uneventful. I do not mention them with the idea of condemning the operation unqualifiedly, but simply to aid in establishing the true value of the procedure and its relative position as an anæsthetic.

Dr. Beverly MacMonagle, of San Francisco, Cal.—I was very much interested in listening to the instructive paper of Dr. Rodman, also in the reports of unfavorable cases. However, it seems nothing more than just that I should speak of two cases that I saw in the practice of a colleague of San Francisco which seemed to be quite successful. The patients were operated upon for appendicitis in the quiescent stage. The injections were made very much after the manner that Dr.

Rodman has described and suggested. He was very successful in getting the cocaine in the proper place; he used the same solution, and, if I remember rightly, I think he said to me he used 20 minims. In about twenty minutes after the injection anæsthesia appeared to be very good. He proceeded with the operation, making an incision through the skin and fascia, muscle, and peritoneum without complaint. The patient seemed to be somewhat excited and considerably more talkative than usual after having taken the injection and while under the anæsthesia; in other words, he seemed to have been laboring under a certain amount of mental excitement. The operation was completed quickly and skilfully and the wound closed. With the exception of the mental excitement, the desire of the patient to talk, to express opinions, and to give advice about the operation, as well as a slight nausea, there were no unfavorable symptoms.

The second case was even more satisfactory than the first, inasmuch as the man did not at the time complain of any nausea. I was told afterward by both patients and my colleague that they suffered a good deal from excitement and vomiting after they had been taken to their rooms. One of the patients told me that he had symptoms referable to the soles of his feet and along his back, and I suggested to him possibly that these were psychological, and he supposed they were, too, as the injection and operation had made a strong mental impression upon him.

I simply mention these cases as additional facts bearing on this interesting subject; however, I would not wish to be understood as advocating or condemning the procedure on the very limited observations I have been able to make thus far.

Dr. Seneca D. Powell, of New York, N. Y.—I have had no personal experience with intraspinal injections of cocaine. It does not strike me that the time is ripe for this method to be presented to the profession at large. It would seem from experience that the results are to be worked out by skilful hands. Most of us can look back to the unfavorable effects which we have had from cocaine in other cases and in other positions. I recall two cases of my own which came under my observation and care a number of years ago in which the patients came very near dying from spraying out the throat with a 2 per cent. solution of cocaine. Most of you who have used cocaine have

undoubtedly had a somewhat similar experience. It is always a safe rule never to medicate in a position beyond your reach, and when you have injected a solution of cocaine into a canal you are absolutely ignorant as to whether that patient has any peculiar susceptibility to its influence or not; and if it so happens that the patient does not require a very large dose, or he will be susceptible to a minimum dose of cocaine, you are almost powerless to protect him from its bad effects.

There is another point: Take the statistics of those gentlemen who have used it. We should always have some hesitation about interfering with a man's politics or religion unless we have better ones to give him, and it behooves us to be absolutely sure that this method is better than other methods of anæsthesia. It is well known that ether and chloroform in the hands of careful anæsthetizers are practically attended with very little danger; about 1 case in 7000 dies under the effects of these drugs.

Dr. J. W. Long, of Salisbury, N. C.—I would like to add a word or two to the discussion, since it is desirable to have reports of unfavorable cases. I have had no personal experience with this method of anæsthesia, but I had the pleasure of attending the Mississippi Valley Medical Association meeting last month, at which time this subject was one of the principal topics under discussion. Dr. Andersen, of Chicago, had resorted to this method of anæsthesia in a number of cases which he reported, and he came to the conclusion that it was a dangerous method. He cited a number of cases, the first one of whom was a negro, who died suddenly several days after the injection of the cocaine. In one case I recall the anæsthesia was not complete until fifteen hours after the cocaine was introduced. In the majority of cases reported by him perhaps there were only one or two in which the anæsthesia was satisfactory in every sense and unattended with any dangerous symptoms. The subject was thoroughly discussed upon that occasion, and I believe only one of the gentlemen present advocated it with any degree of enthusiasm. The President of the Association, Dr. Moyer, of Chicago, a prominent neurologist, was called upon to give his opinion in the matter, and it seems that he had followed Dr. Andersen's cases very closely, visiting them and watching them carefully. His verdict was not to use that method. He stated

that the time had not yet arrived when this method of anæsthesia should be given out to the general profession; at the same time, it is not proper to abandon it. The experiments should be carried out in hospitals that are provided with every facility for guarding against error, for making bacteriological investigations, etc.

We are indebted to Dr. Rodman for his excellent paper and the conservative position he has taken. I agree with Dr. Powell in uttering a word of caution in the use of cocaine in this manner.

Dr. Rodman (closing the discussion).—I am exceedingly gratified that there has been such a liberal discussion of my paper, for it was dictated at the last moment simply to elicit a discussion more than anything else, because there have been a great many complete résumés of the literature of this subject. I am very glad that Dr. Macdonald has reported a case which will make us hesitate even more than we have heretofore to use this form of anæsthesia. I was very much prejudiced against it when it was first introduced, and it was only after I happened to be in Buffalo, where I met a gentleman who had been following Kocher's clinic for some months, and who told me that Kocher was using it daily with great satisfaction and predicted that it would very largely supplant ether and chloroform, that I was disposed to give it a single trial. I had seen Kocher work, and was impressed with the belief that he represents everything which is best in surgery and could not indorse so fully anything without merit.

The first case I used it on was a man, aged forty-five years, with a bursa in the popliteal space, associated with marked kidney trouble. I thought it was a favorable case for the method. I was afraid to give ether, and, as many of you know, it is not at all popular to give chloroform in Philadelphia, I thought I would try this method of producing anæsthesia. It was absolutely satisfactory in every respect. The man was kept in the ward of the hospital for three weeks; there was never a rise of temperature beyond 99°. The man had no symptoms at all except that he passed a wakeful night after the operation. There was no headache, no delirium, no disagreeable symptoms. The next case I used it on was an elderly man, nearly sixty years of age, who had been a hard drinker. He was admitted to the hospital for an old ulcer of the leg which had been pre-

viously treated. The patient informed me that he had previously taken ether and had almost died under its influence. I used this new method in his case with a happy result. I blindfolded him, so that he could not see what was being done. It is my custom to blindfold all patients and stop their ears with cotton. I did the ordinary Schede operation. His temperature never rose above 99°; he never has had any trouble, and when I went into the ward half an hour after the operation I found him laughing. In reply to a question, he said: "I am laughing at my friend, who took ether; he is sick at his stomach, while I never felt better in my life."

The next case was one of advanced kidney trouble. I did a suprapubic cystotomy. I was afraid to give a general anæsthetic. I believe we have lost more cases on account of anæsthetics than from the operations themselves. I believe it is "the last straw" in some cases that takes them off. Where I have to give a general anæsthetic in these cases I prefer chloroform. This method is indicated in those cases where there are positive contraindications to ether and chloroform.

Dr. Macdonald brought out an interesting point in connection with this subject, namely, the medico-legal aspects. I have obtained the consent of every patient on whom I have used it. We ought to do this as a matter of safety to ourselves. My results have been favorable in every case I have used it. Patients in the hospital are asking me to use it instead of chloroform and ether. I have gotten the consent of patients in the presence of witnesses before using the method, because it is as yet *sub judice.*

One of the gentlemen (Dr. Mallett) spoke of the anæsthesia not being complete in an abdominal case. That point has been brought out by Fowler, who has done more than forty operations by this method. However, anæsthesia has been very complete in nearly all of his cases, and yet he says that where there are acute inflammatory conditions in the abdomen, the anæsthesia is sometimes not as complete as it might be.

Someone referred to withdrawing the needle if it does not enter the canal easily. There is no question but what the needle should be withdrawn rather than ploughed through the tissues. If one finds that the needle does not enter the canal readily it is better to pull it out and begin over again. There is less danger of breaking the needle and of traumatism to the tissues.

The after-symptoms are very transitory. I have not known nausea to last more than fifteen minutes. It has in each case been promptly arrested by pellets of ice. On entering the ward after an operation (say an hour afterward) patients are found perfectly tranquil. The anæsthesia lasts about an hour and a half—at least it did so in the cases I used it on—and there is no more or less pain than there would be after chloroform or ether. I must say that I am very much better pleased with the method than I expected to be, yet it is a serious thing to puncture the subarachnoid space of anyone. I shall not do it at present unless there is some contraindication to the administration of ether or chloroform. I am perfectly satisfied in my own mind, from my own experience, that if I were to be operated upon and had a nephritis I would not take ether; if, on the other hand, I had heart trouble I would not take chloroform, but would submit to this method of anæsthesia.

As to the dangers of ether and chloroform, they are, I think, greater than was stated by Dr. Powell. He said that about 1 in every 7000 dies from the administration of those agents. My recollection is that when we received the report of the German Surgical Congress three or four years ago it was stated that ether killed 1 in 5500 cases and chloroform 1 in every 2200 cases. If we consider the number of deaths from nephritis in which ether has been given it is very little, if any, safer than chloroform. I believe the secondary dangers of ether are great, and the advantage of chloroform is that if you get the patients off of the table they are all right. With ether, patients have suppression of urine and other symptoms that make this agent as dangerous as chloroform. Still, I believe these agents should be used. Possibly we might do better than we are doing now by using nitrous oxide in many minor operations where we can get through in five or ten minutes. This is certainly safer than subarachnoid injections, ether, or chloroform, and should be more frequently used at our clinics. I have for years used it now and then at my clinic, but not so frequently as I should.

THE REMOVAL OF PELVIC INFLAMMATORY MASSES BY THE ABDOMEN AFTER BISECTION OF THE UTERUS.

By Howard A. Kelly, M.D.,
Baltimore, Md.

I pointed out but recently[1] the great advantages which accrue from the bisection of the myomatous uterus in an abdominal enucleation in certain complicated cases. I now desire to call your attention to the great value of a somewhat similar procedure in certain cases of pelvic inflammatory affections.

In most instances of pelvic infection the ovaries are innocently, only accidentally, involved in the inflammatory process, and, as a rule, one or both of them can be saved even though it is found necessary to sacrifice both uterine tubes. If one ovary is saved, the uterus must also be saved if possible, as by doing this we conserve the function of menstruation as well as that of the internal secretion of the ovary.

Where the ovaries are seriously involved in the disease, where they are converted into abscess sacs or into large hæmatomata, or where they are so densely and intimately matted in with the inflamed tubes that it is useless to attempt to save them, the removal of all the diseased organs, together with the uterus, is demanded whenever it is possible in the following way: by freeing the tube and the ovary on the least adherent side first, and then, after tying off the broad ligament and pushing down the bladder and securing the uterine artery, the most difficult side is easily reached and enucleated by

[1] Johns Hopkins Hospital Bulletin, 1900, vol. xi., p. 56, and American Journal of Obstetrics, August, 1900, vol. xlii.

cutting across the cervix and exposing the opposite uterine vessels and ligating them. The uterus is then pulled up until the round ligament is caught and divided.

At this point the operation may follow one of two courses, according to the difficulties encountered. In the first place, if after dividing the uterus and pulling it up, the remaining tube and ovary can be readily enucleated by peeling them out from below upward by working with the fingers in the lower and anterior part of the pelvis, then the enucleation may be concluded by removing all the structures in one mass. In the second place, if the tube and ovary on the far side are densely adherent and offer any serious difficulties in the enucleation, then I would clamp off the uterus at its cornu and remove it with one tube and ovary, and so leave the more difficult side to be dissected out after emptying the pelvis, securing all the advantages of increased space and light. I have already described this method as that of enucleation by a continuous transverse incision from left to right or from right to left.

It is now my desire to describe another method of enucleation through an abdominal incision which is applicable to a class of cases still more difficult than those just referred to. Let us suppose, for example, a case in which there are *pelvic abscesses on both sides densely adherent to all the surrounding structures*, including the uterus; and we will also suppose that the uterus itself is almost or quite buried in a mass of adhesions. In such a case the plan I have just described in detail is scarcely applicable, inasmuch as there is no easier side to begin on to start the enucleation, for both sides present extreme difficulties.

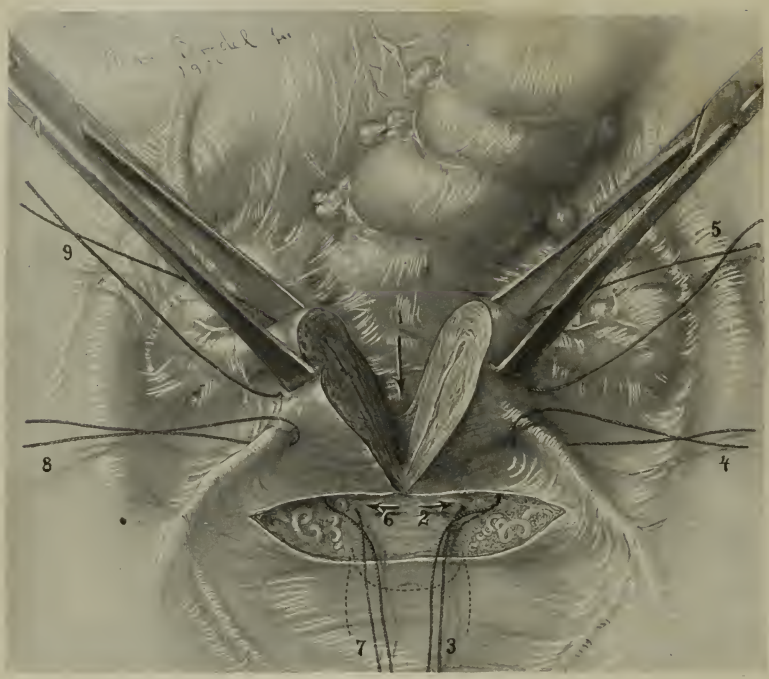
The method of a continuous transverse incision does actually give us, it is true, a great advantage over the older method of tying down on both sides, for the simple reason that the enucleation of the further side, wherever we begin, is always easier, even though the difficulties of the first side are just the same by either method.

If, now, I could devise any method by which the enuclea-

Fig. 1.

The first step in the bisection of the uterus. Fundus exposed and both cornua grasped by forceps and pulled up. The black line indicates the line of section.

Fig. 2.

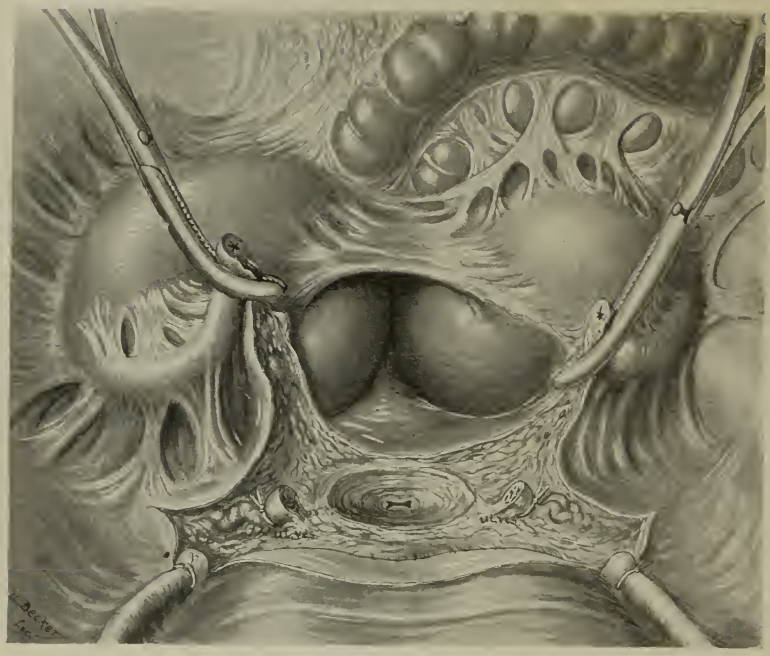


The fundus bisected down into the cervix. The bladder detached and pushed down. The order is: 1. Division of the fundus in the direction of the arrow. 2. Division of the left half of the cervix, exposing the left uterine vessels. 3. Control of the left uterine vessels. 4. Clamp on the left round ligament. 5. Clamp to the left uterine cornu. 6. Division of right cervix. 7. Control of right uterine vessels. 8. Clamp to right round ligament. 9. Clamp to right uterine cornu, followed by enucleation of the inflamed ovaries and tubes.

Fig. 3.

The uterus bisected, and the right half inverted and attached only by its cornu. Showing also the ease with which the right tube and ovary can be attacked from below.

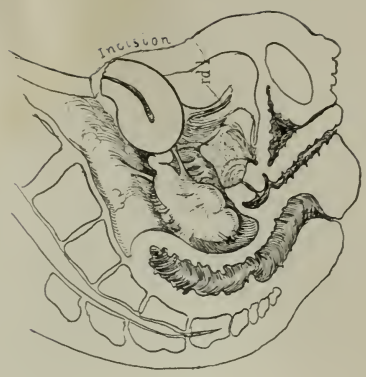
Fig. 4.



Showing the pelvis with the uterus removed, leaving the adherent tubes and ovaries to be enucleated afterward.

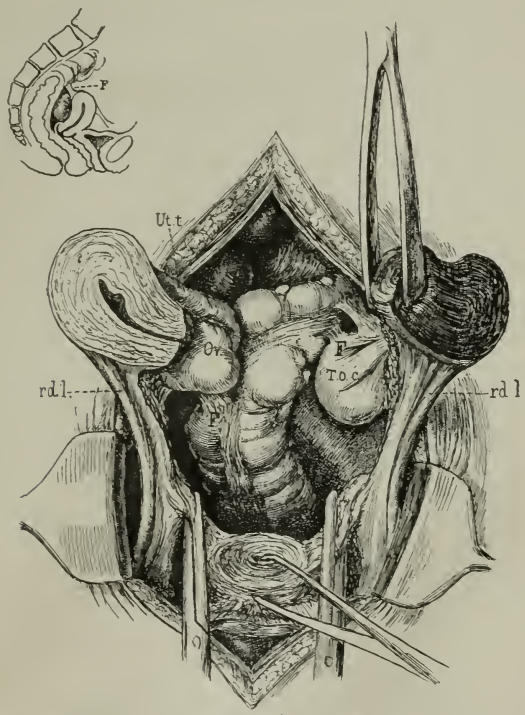
Fig. 5.

Fig. 6.



Figures 5 and 6 show, in a case of pelvic inflammatory disease (Fig. 5), the ease with which the uterus can be bisected and inverted (Fig. 6) and removed without traction on the lateral infiammatory mass.

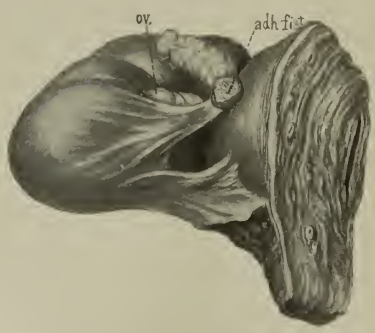
Fig. 7.



Showing the condition found in which there were fistulæ from uterine tubes leading into the sigmoid flexure and rectum. The bisected uterus is lifted completely outside the abdomen.

Fig. 8.

Fig. 9.



Figures 8 and 9 show the halves of the uterus with the attached uterine tubes and ovaries. The points of fistulous communication are noted on the drawings.

tion of *both tubes* and *ovaries* could be effected from below upward, it is manifest that a great advantage would be gained.

The vaginal-hysterectomists have thus far had a decided advantage over those of us who prefer to operate above the symphysis, in the greater facility with which the adherent structures can be detached when they are attacked in the direction from the pelvic floor upward. In the method I am now about to describe this decided advantage is secured for and combined with the other great advantages of the abdominal route—that of increased room and increased facilities of handling, abundant illumination, as well as the detection of various complicating conditions.

The steps are these: If the uterus is buried out of view the bladder is first separated from the rectum and the fundus found; then if there are any large abscesses, adherent cysts, or hæmatomata, they are evacuated by aspiration or by puncture; the rest of the abdominal cavity is then well packed off from the pelvis.

The right and left cornua uteri are each seized by a pair of stout museau forceps and lifted up; the uterus is now incised in the median line in an antero-posterior direction, and as the uterus is bisected its cornua are pulled up and drawn apart. With a third pair of forceps the uterus is grasped on one side on its cut surface, as far down in the angle as possible, including both anterior and posterior walls. The museau forceps of the same side is then released and used for grasping the corresponding point on the opposite cut surface, when the remaining museau forceps is removed. In this way two forceps are in constant use at the lowest point. I commonly apply them three or four times in all. As the uterus is pulled up and the halves become everted it is bisected further down into the cervix; if the operator prefers to do a panhysterectomy the bisection is carried all the way down into the vagina. The uterine canal must be followed in the bisection, if necessary using a grooved director to keep it in view. The museau forceps are now made to grasp the

uterus well down in the cervical portion if it is to be a supravaginal amputation, and the cervix is bisected on one side. As soon as it is divided and the uterine and vaginal ends begin to pull apart, the under surface of the uterine end is caught with a pair of forceps and pulled up, and the uterine vessels, which now can be plainly seen, are clamped or tied. As the uterus is pulled still further up, the round ligament is exposed and clamped; then, finally, a clamp is applied between the cornu of the bisected uterus and the tubo-ovarian mass, and one-half of the uterus is removed. The opposite half of the uterus also is taken away in the same manner.

The pelvis now contains nothing but the rectum and bladder, with right and left tubo-ovarian masses plastered to the sides of the pelvis and the broad ligaments, affording abundant room for investigation of their attachments as well as for deliberate and skilful dissection. The wide exposure of the cellular area over the inferior median and anterior surfaces of the masses offers the best possible avenue for beginning their detachment and enucleation.

The operator will sometimes find on completing the bisection of the uterus that he can just as well take out each tube and ovary together with its corresponding half of the uterus, reserving for the still more difficult cases, or for a most difficult side, the separate enucleation of the tube and ovary after removal of the uterus.

The operation which I have just described is not recommended to a beginner in surgery; the surgeon who undertakes it must be calm and deliberate and must bear in mind at each step the anatomical relations of the structures.

The most critical point is the bisection of the cervix and controlling the uterine vessels. If the cervix is slowly and cautiously severed, with a steady traction on the uterus under perfect control, there is no danger of seeing the organ suddenly tearing out with rupture of the uterine vessels and frightful hemorrhage. As the divided cervix is pulled apart the uterine vessels are beautifully exposed and easily caught,

and only a clumsy operator will plunge his needle or a pair of forceps deep down into the tissues and clamp a ureter. By cutting up the cervix so as to leave a snip on each side, the uterine vessels can be caught at a higher level than that of the division of the cervix.

There is no danger of injuring the bladder, which needs less attention than in any other method of hysterectomy. When the bisection reaches the vesico-uterine fold it may be continued carefully behind this fold well down into the cervix under the bladder, which is then easily pushed down as the divided cervix is pulled apart. A simple and a safe way is also to incise the vesico-uterine peritoneum from side to side and push it down with a sponge on a staff and bare the cervix.

If the uterus is densely adherent to the rectum all the way up to the fundus, a modification of this plan of operating may be followed: the anterior face of the uterus may be bisected and the cervix divided horizontally and the uterine vessels caught, then the rest of the uterus may be carefully divided up its posterior surface in a direction from the cervix toward the fundus. The relations to the rectum are examined as the division is made, and at any point where it seems necessary a piece of the uterine tissue may be left adherent to the bowel. After the bisection the rest of the enucleation is effected as described above.

I have had abundant opportunity to demonstrate the practical value of this method of treatment in my clinic this year.

In one case (M. T., April 21, 1900) the uterus, *tubes, and ovaries were so densely adherent* that an effort to free them by the vaginal route failed, when I opened the abdomen and caught the uterus by its cornua and bisected it half-way down the cervix, and then removed each half of the uterine body; then with a maximum space, under sight and touch, the tubes and ovaries were dissected out.

In another instance (W., May 5, 1900) the entire uterus was bisected and removed, and after its removal a large pelvic abscess was extirpated on the right side.

In a case operated upon November 7, 1900 (M. W.), the sigmoid on the left and the rectum on the right were the seat of *fistulous openings into the uterine tubes.* Here the fistulæ and other complications did not have to be treated until the uterus was divided and brought out into the surface.

Another patient in my private hospital had *tubercular disease of both tubes* (S., April, 1900), which were removed, with a bisection of the uterus.

In one instance (M. B., October 17, 1900) there were extensive *hæmatomata of both ovaries,* with dense adhesions, and a most difficult enucleation was rendered safe by bisection.

In the case of a large *cancerous right ovary* (M. B., May 19, 1900) extending into the pelvic cellular tissue I found a bisection most helpful in clearing out the pelvis and exposing the disease on its median and under sides, and so making possible a much completer enucleation.

The dangers of the method are those of any novel procedure, and must arise for the most part from want of due attention to the details; for example, one can by reckless cutting divide the uterus obliquely so as to cut directly into the broad ligament among the uterine vessels, instead of following the uterine canal and making a true coronal section. Again, rashly cutting, one can divide one-half of the cervix and the uterine vessels at the same time, with frightful hemorrhage; and by clamping the bleeding uterine vessels in an indiscriminate fashion the ureter may be easily included in the clamp.

I suppose, too, that it is easily possible, with sufficient carelessness, to cut a hole in the bladder.

The risk of sepsis from opening the uterine cavity is practically *nil* if gauze is packed in around the uterus; furthermore, the study of great numbers of these uteri has shown that the infection rarely ever lingers in its cavity.

The advantages of a bisection and enucleation of the uterus as a preliminary to a complete enucleation of uterine tubes and ovaries for pelvic inflammatory and other diseases by the abdominal route are briefly recapitulated:

1. Additional space for handling adherent adnexæ afforded by the removal of the uterus.

2. Great increase in facility for dealing with intestinal complications.

3. Better access by new avenues from below and in front to adherent lateral structures.

4. Elevation of structures to or above the pelvic brim or even out into the abdomen, bringing them within easy reach of manipulation and dissection.

5. Some advantage in approaching both uterine vessels by cutting from the cervix out toward the broad ligament, as is secured in approaching one of them in the continuous transverse incision.

In general, the time of the operation is shortened, its steps are conducted with greater precision, and surrounding structures are far less liable to be injured. In this way there are fewer troubles and sequelæ and the mortality is lessened.

I take it that in intraligamentary tumors of both sides this procedure will prove of the utmost advantage in exposing the tumors at a point low down in the loose cellular tissue of the broad ligament.

DISCUSSION.

Dr. Willis G. Macdonald, of Albany, N. Y.—Mr. President: My experience in bisection of the uterus as an operative procedure has been very largely associated with tumors of the uterus deeply situated in the pelvis and accompanied with great tension upon both broad ligaments. In dealing with fibroids of the uterus for some years past it has been my custom to follow the operation improved very largely by Dr. Kelly, and the only objection that I have had to it lies in a certain class of cases in which the tumor is so deeply situated in the lower segment of the uterus, or comes out to one side or the other in the broad ligament, or is associated with microcystic and adherent ovaries, that when we come to lift the tumor out of the abdomen to begin preliminary ligation on one side or the other we produce a great deal of tension upon the broad ligament, and when the

ligature is placed upon one or other ovarian artery there is more or less danger of its giving way when the tension is released. I have seen in my own cases and in those of other surgeons in my neighborhood this accident occur a number of times. In cases of fibroid tumors of the uterus, particularly those associated with firmly adherent appendages, we find sometimes it is quite impossible to get at the tumor at all, and I was driven to bisection of the uterus through no theory or choice, but as a matter of being compelled, if I were going to remove the pelvic tumor, to do something different than I had ever done. I placed at each angle of the uterus (which had a fibroid nearly as large as my head), instead of large forceps presenting outside, the old-fashioned corkscrew, one in each corner, and began division in the median line, going into the border of the capsule of one growth, then passing to that of another by keeping up tension of both angles, and hemorrhage did not occur. Then you can enucleate and cut down until you complete the bisection. In my experience, an operation of this sort terminates more frequently in a panhysterectomy than it does in a supravaginal hysterectomy, and we do here on two sides what Doyen, in his more recent operation, attempts to do as a whole. When we take a bisected uterus and commence at the lower angle the first important vessel on either side is the uterine artery, which we secure. Doyen's method is to enter the posterior cul-de-sac, seize the cervix, pull it up through the opening in the cul-de-sac of Douglas, get it on tension, and lift the body over the symphysis, the patient being in the Trendelenburg position; then he enters the pelvis, not attempting to remove the appendages, but doing the secondary operation, as described by Dr. Kelly. This plan of operating presents advantages, but in my experience I have been able more frequently to get the entire body of the uterus—cervix and all—than I have in leaving any cervical stump. The method certainly presents advantages, particularly in the treatment of those cases of fibroids of the uterus in which the tumor is located in the lower segment and also in the same condition as when we have a tendency to inflammatory conditions. In old cases of inflammatory pelvic disease with extremely firm adhesions, or in the more recent cases associated with acute and virulent abscesses, we are more likely to tear into the intestines and do damage or

tear into the bladder; yet, after all, we are not going to distribute very much infection on account of the old existing pathological condition. The virulence of the bacterial invasion has died out, and it is not often where we have strong adhesions that we have a virulent pus collection associated with it, but it is in the soft type of adhesions where we have virulent pus—the more recent cases, in which fibrous organization has not advanced to any great extent. In my experience I have found bisection of the uterus an excellent preliminary procedure to release tension on the broad ligaments, and that is what it is for. It relieves tension, so that we can more certainly control the blood-supply, and it affords the advantage of dealing with any fistulous tracts which may be associated with the rectum or sigmoid, as has been so well described by Dr. Kelly.

Dr. J. Wesley Bovée, of Washington, D. C.—For some time I have been in the habit of occasionally removing the body of the uterus previous to taking out the appendages in pus cases and in fibroid tumors of the uterus, but more particularly I have followed this work since Dr. Kelly read his paper before this Association, in Washington, on the removal of fibroid tumors of the uterus by going down on one side and coming up on the other, as he has described to-day. I have recently followed a modification of this plan in dealing with pus in the pelvis, and that is to cut off the tube and ovarian ligament from the uterus on one side, clamping the round ligament, going down to the cervix, clamping the uterine artery, cutting through the cervix and uterine artery on the other side, and going up and removing the appendage on the other side, with the uterus. In some cases, however, I have had to completely remove the uterus; I have not bisected it. I have followed the plan of removing the body of the uterus first. In the enucleation of recent pus collections, as Dr. Macdonald has said, the great point to be attained is to enucleate the pus collections without spilling the pus. The danger is from infection. Removing the uterus leaves an extra space for packing gauze around during liberation. Very often these pus collections are not walled in by the Fallopian tube or by the ovary itself, but are partially limited by adhesions to other structures. Dr. Kelly mentioned one case where he had a fistula connecting with the sigmoid and rectum. In enucleating such cases we necessarily spill pus in removing them. We

cannot help it. If the fimbriated end is glued up and pus is confined in the tubes, and we are careful, we can remove it without rupture; if the tube be much compressed we are liable to spill pus and must have gauze to catch it as soon as it is spilled. In dealing with fibroids of the uterus in which there was tension I have found it necessary to go down and clamp off the Fallopian tube and ovarian ligament on one side, picking up the vessels and removing the appendages later. I have not in my cases removed the cervix except in women near the menopause, and especially if there has been a laceration of the cervix or any diseased condition of it. The splitting of the body of the uterus, however, as has been shown to-day, is a superior operation, but it carries with it the danger of bringing up into the peritoneal cavity the cervix from a region which is not always thoroughly sterilized, and, therefore, it is a danger connected with the technique—the danger of bringing infection from the vagina up into the peritoneal cavity. I would, therefore, limit the method to cases in which it seems to be easier to do or in cases nearer the menopause.

I think Dr. Macdonald is quite right. We all agree with him as to the two varieties of pus cases and of the greater necessity for caution in spilling pus in the early cases of infection rather than in the later ones, and the removal of the body of the uterus; in many cases of pelvic inflammatory disease the adhesions to the body of the uterus are such as to leave a jagged surface, which predisposes to the attachment to the intestines afterward, causing such trouble, perhaps, as pus-tubes have caused, and, therefore, the body of the uterus in many of these cases needs to be removed on that account as well as on account of infection of the endometrium. But wherever that does not hold good, and the adhesions are not to the body of the uterus, and the posterior roof of it is smooth, I would feel disposed to save the uterine body wherever it is possible.

Dr. W. E. B. Davis, of Birmingham, Ala.—The method recommended by Dr. Kelly will undoubtedly be of assistance in a few severe cases of inflammatory disease of the pelvis. He has dealt with these cases through the abdominal incision and accomplished what the French surgeons have done for a long time by the vaginal route. Most of you know that the removal of the uterus for inflammatory disease had its origin in the diffi-

culties which beset French surgeons in removing the appendages through the vagina, and it became necessary for them, in order to have a route through which they could reach the adnexæ, to remove the uterus. It then became popular to remove the uterus in all cases. Dr. Kelly has simply put into practice the method of attacking these cases from above.

Dr. Beverly MacMonagle, of San Francisco, Cal.—It has been my privilege to see Dr. Kelly operate, during the past two weeks or ten days, on two cases by the method he has described. The advantages of the operation, as the doctor described them, are really accentuated when one sees him do the operation. The first case in which I saw Dr. Kelly do the operation was a peculiar case of fibroid of the uterus. There was on the cervix a small mass that could be seen through the vagina. There was in the body of the uterus quite a large soft fibroma; there was down below that a comparatively large hard fibroid, and then at the junction of the cervix with the uterus was another fibroid, a little harder than the one in the body of the uterus. As Dr. Kelly opened the abdomen he said it was a favorable case to demonstrate his improved method of bisecting the uterus in cases of fibroids. He made the bisection, and after going through the body of the uterus and removing the fibroid in the fundus of the organ he came down on a small hard fibroid, and then determined to make a panhysterectomy. Having grasped the two cornua of the uterus with forceps and splitting down through, I was surprised to see the manner in which the uterus came up and the ease with which the cervix was raised toward the surface as the incision went on down. He made his incision down, and when he went through into the vagina, the bladder being situated to the front, he turned the upper end of the vagina almost parallel with the abdominal wall; then the method was simple, indeed. To cut off the top part of the vagina as it joined the cervix on either side he secured the uterine artery, the ureters being made safe by being pressed forward and up toward the wall of the pelvis. The fibroid came up nicely, and as the tension was relieved the uterine artery on the right side, where the doctor had raised a snip, was tied quite high up on the side of the uterus. The ovaries and tubes being useless were removed at the same time, and the operation was completed by closing the peritoneal cavity below

in a comparatively short time, which appeared to me to be very easily done.

I was still more impressed when, a few days afterward, he performed the operation on a case of inflammatory pelvic disease in which there were adhesions to the rectum and sigmoid. (The doctor spoke of this case.) It was not completely walled off. It was a case in which he could have gone down on the one side and raised the Fallopian tube and ovarian artery and tied them off, going down around and up the other side. After going down through the centre and taking hold of the uterus at the internal os with museau forceps it was cut off. I was surprised at the manner in which everything was raised up. The ovaries were then easily dealt with. One side was taken out entirely, and the other side, which was attached to little tabs that came off from the rectum, was raised up, there being two small holes discovered, one in the rectum, the other in the sigmoid flexure. The sigmoid flexure and rectum were raised and easily reached, and it looked to me, as Dr. Kelly did the operation, that it was an easy operation to do. I do not mean by that to say it would be an easy one for me to do. The fact that the low part of the cervix and the tip that connects Douglas' cul-de-sac with the peritoneal cavity was raised so that he could work almost on a level with the abdominal wall seemed to be a great advantage.

Dr. Willis G. Macdonald, of Albany, N. Y.—I hardly thought it was of sufficient importance to put on record this method of bisecting the uterus, and I have no right to any claim of priority because I have not published what I have done by this method. However, the Baer method of dealing with uterine fibroids has been practised by Dr. Vander Veer in the Albany Hospital for the past four or five years. I have a distinct recollection of having operated on one case in 1898 by a similar method to the one described by Dr. Kelly, and as I did not attach any importance to the matter at that time I did not publish it.

Dr. George J. Engelmann, of Boston, Mass.—I was very much pleased with the operation presented in Dr. Kelly's paper and the method he has described. Those of us who have seen the results of this method per vaginam—the uterus coming down and all the agglutinated mass brought into view after such

incision in the vaginal operation—must be amazed that no one has ever before thought of adopting this method of dealing with this class of cases in operations by the abdominal route. Dr. Kelly has pointed out with what comparative ease the parts are exposed and brought within reach. The only difference between the method by the vaginal and abdominal route in suppurative cases is, I presume, that it is more dangerous to leave suppurative areas in place. The advantage of the vaginal method in such cases is that adherent suppurating masses which cannot be removed can be left with safety, as drainage is perfect. They are, perhaps, more accessible by the abdominal route, but it is more dangerous to leave them. Pus from recent cases only is dangerous, while in the old ones it seems harmless, and with free drainage complete removal is not a necessity.

Dr. Hal C. Wyman, of Detroit, Mich.—Before Dr. Kelly closes the discussion I wish he would tell us a little more about the range of application of this method. Its field in cases of inflammatory deposits in the pelvis would appear to me somewhat limited and that in many cases he is taking out a little more of the sound uterus than he is of the disorganized appendages. I trust he will make that point clear to us.

Dr. Howard A. Kelly, of Baltimore, Md.—I am deeply gratified that my friend Dr. MacMonagle should have taken such a generous interest in the cases operated upon at my clinic in his presence.

If there are any honors connected with the bisection method I shall be happy in sharing them with Dr. Macdonald and Dr. Vander Veer, of Albany.

The method is one which should be practised only by those surgeons who are immersed in this kind of work, and its field of usefulness is restricted to a small percentage of all the cases. It is not a universal remedy. I have briefly indicated the class of cases to which it is particularly adapted—those in which the adhesions of the tubes and ovaries are dense on both sides and the organs useless, as far as function is concerned, in cases of pelvic inflammation, hæmatoma, or carcinoma—as one instance. If both ovaries are to be removed in any case, I always prefer to take out the uterus, too, and it is only in such cases that the method is employed. It has been suggested that the idea is in a way derived from doing vaginal hysterectomies.

This is not a fact, as the differences are great. The vaginal hysterectomist bisects the uterus from the cervix upward, while I bisect it in an opposite direction from the fundus downward. I then cut across the cervix and tie the uterine vessels. I work with abundant light and room, while the vaginal hysterectomist is cramped, etc. It is the difference between comfort and assurance and certainty and uncertainty.

I was driven to resort to this method in the first instance in a desperate case of a large vascular uterine fibroid in a patient who was extremely anæmic from excessive hemorrhages. Bisection saved her life. I then tried it successfully in many cases of fibroids and after that in the field of pelvic inflammatory diseases.

Dr. Lewis S. McMurtry, of Louisville, Ky.—I would ask Dr. Kelly to mention one other point in his technique of dealing with cases of inflammatory pelvic disease by the method he has described. We have been very much interested in the work he has presented to us. Before he closes the discussion I would ask him whether or not, in cases of suppurative pelvic inflammation, he is in the habit of doing this operation where a panhysterectomy is only done, and whether he makes a drainage tract into the vagina or closes up the vagina. Is it your custom, Dr. Kelly, to rely largely on gauze packing to guard against rupture of the suppurating foci, or in doing a panhysterectomy do you close the vagina over where you have opened it or do you drain?

Dr. Kelly (closing the discussion).—In answer to the query of Dr. McMurtry, in bisection as described there is no danger of distributing pus over the field of the operation, as we can wall off the infected areas so as to protect the abdominal cavity and enucleate the structures without any contamination. If the case is an old one I close the abdomen completely, unless some portion of the abscess or the sinus leading from the abscess is left behind. If I leave any part of an abscess or sinus I drain in the direction of the vagina.

OSTEOFIBROMYOMA OF THE UTERUS.

By George Ben Johnston, M.D.,
Richmond, Va.

The rarity of the occurrence of osseous deposits in the uterine wall was well set forth by Dr. C. Jeff. Miller in his report of "A Case of Ossification of the Uterus," read before this Association at its last meeting. In this report he stated that a thorough review of the literature on this subject showed a record of but six cases of ossification of the uterus since 1759, his being the seventh in all and the first reported since 1852. My own review of obtainable literature verifies the facts as stated by him.

Whether this scant record be due to the exceeding rarity of its occurrence or in part to the carelessness of observers in recording so unusual a case whenever met with would be a difficult question to solve. It is, however, striking, after a lapse of nearly half a century in which no case has been recorded, that two members of a society with a membership of one hundred and forty-three should in successive years meet with this strange phenomenon.

The case I have to report is that of Mrs. S., a woman aged thirty years. She was the mother of three children, the youngest being three years old. About two years after the birth of the youngest child she noticed some enlargement of the abdomen and at times experienced difficulty in voiding her urine. She believed herself pregnant, but on account of the continuance of her menses and increasing difficulty of micturition she consulted her physician, Dr. R. W. Sanders, of Max Meadows, Virginia, and an examination of her genital

organs was made. This disclosed a tumor which filled the pelvic cavity, growing from the posterior wall of the uterus and so displacing the uterus forward that it pressed upon the bladder. Six months later she missed her menstrual period, and by this time her size had greatly increased and her ability to void her urine normally was almost lost. She was a woman of active habits and continued to perform the hard work constituting the housewifely duties of her class. About the middle of March, 1900, after being all day upon her feet, a severe hemorrhage occurred, and the next day she passed a fœtus of six or eight weeks' development. Hemorrhage was promptly checked, but her size did not reduce and the pressure symptoms continued.

I operated upon her at the Wytheville Sanatorium, conducted by Dr. John T. Graham, on April 10, 1900. Bimanual examination, made before the operation, revealed two tumors—one a large fibromyoma, situated posteriorly and to the right of the uterus, the other a small tumor, anterior and to the left. Complete hysterectomy was performed. The smaller tumor was found to be intramural and situated at the junction of the body and the neck. On liberation the macroscopical examination showed a tumor about the size of a small orange and of firm consistence. Held between the thumb and fingers it gave the sensation that is produced by pressing a hard-boiled egg the shell of which has been broken. Plates apparently of bone encompassed the surface, and on opening it a substance resembling medullary tissue or brain was found. This was unfortunately lost, so that no subsequent histological study of it could be made.

Attached to the lower part of the osseous tumor was a small, fleshy mass which contained a body about an inch in length, resembling a heart in shape. Dr. Graham, who assisted in the operation, suggested the possibility of an ectopic pregnancy with skull and heart partly developed.

On opening the uterus a recent placental site was found near the uterine opening of the right Fallopian tube.

Microscopical examination of the tumor, made by Dr. B.

M. Randolph, lecturer on pathology in the Medical College of Virginia, developed the following characteristics: It was covered by a fibrous capsule, scattered through which were plates, rounded nodules, and irregular, jagged masses, which when decalcified proved to be dense laminæ of bone with their included bone cells. These bone cells were not so numerous as in normal bone, while the laminæ were irregular in their arrangement, though showing a general tendency to lie parallel to frequent openings in the bony tissue. These openings were larger and more irregular in shape than the Haversian canals of normal compact bone, and were filled with a connective tissue stroma supporting bloodvessels.

The softer parts of the tumor were found to be composed of involuntary muscle-fibres arranged in groups and bundles, which were supported by loose connective tissue. Dense masses of fibrous tissue occurred throughout the tumor independently of the muscular tissue.

This microscopical examination of the tumor verified the diagnosis made macroscopically—osteofibromyoma.

The recovery was long and tedious, but the patient has now for some months been able to perform her lighter domestic duties.

Dr. Kelly requested Dr. Johnston to submit the specimen to Dr. William H. Welch, of Johns Hopkins University, for examination. This was done, and Dr. Welch's finding is incorporated as a part of the report of this case.

Examination of Tumor of the Uterus.

By William H. Welch, M.D.,
Johns Hopkins Hospital, Baltimore, Md.

Sections from the different pieces which were sent show a variety of tissues.

1. *Smooth Muscle.* This is present in considerable amount, although not predominating in these pieces. It occurs especially around masses of bone and around areas of soft connec-

tive tissue, in places making a kind of capsule for these structures. It is as usual in irregular, interlacing bundles and is the seat of considerable hyaline degeneration.

2. *Bone.* True bone is present, showing bone corpuscles with canaliculi, typical basement substance, lamellæ, and Haversian canals, with marrow substance. The lamellæ are arranged around the marrow spaces with more or less regularity. Some of the bone seems to be formed by a direct metamorphosis of connective tissue, and is, therefore, so-called osteoid; but there are places which show osteoblasts forming bone in the usual way.

The tissues within the marrow spaces varies. It is well supplied with bloodvessels. In some places it is dense fibrous tissue, in others more delicate tissue, and in the latter case may contain large numbers of lymphoid cells. Particularly abundant in the marrow are large cells filled with granules, which may be fine droplets of fat. Adipose tissue cells occur, but are few.

3. *Embryonic Types of Connective Tissue.* There are large areas—in some pieces composing most of the tissue—of a delicately fibrillated tissue very rich in cells. These cells are predominantly young connective tissue cells, but there are also lymphoid and plasma cells and eosinophiles. Rim-walled bloodvessels are fairly abundant. This embryonic tissue is apparently of soft consistence. In addition, in connection with this tissue and also independently, are areas of soft mucoid tissue, with large, elongated, and branching connective tissue cells. In one set of sections this embryonic tissue occupies all except a narrow peripheral rim, which is composed of smooth muscle. There are hyaline and necrotic changes in these tissues.

4. *Ordinary Adult Fibrous Tissue.* This is present in connection with the bone and other tissues.

5. *Degenerations.* There are extensive areas of degeneration: (*a*) Calcification both of muscle and hyaline connective tissue; (*b*) hyaline and necrotic changes have affected considerable areas; (*c*) actual disintegration on the necrotic areas,

with fatty metamorphosis and deposit of cholesterin crystals.

Diagnosis. Histologically, Dr. Randolph's designation of the tumor as *osteofibromyoma* is unobjectionable.

Remarks. The tumor must, I think, be referred to embryonic remnants, and there is no objection to considering it as a teratoid formation, although not a very complex one. Beside the bone and smooth muscle there is a great deal of peculiar embryonic connective tissue in the growth, partly mucoid in character and partly more cellular, and this tissue is quite unlike any found in ordinary myomatous tumors.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—Mr. President: The specimen is an interesting one, and in view of the rarity of these tumors I wish the essayist had gone more elaborately into the microscopical study and presented some convincing drawings. I should also be loath to accept any diagnoses made over twenty years ago, when the difference between calcified tumors and teratomata was not clearly understood.

Stony tumors like that Dr. Johnston has presented bring up as a matter of general interest the question as to the relative frequency of other dense tumors of the uterus in general. I have looked over the histories of my myomectomies and hysteromyomectomies and I find that in 561 cases I had twenty-seven cases of calcified myomata—about 5 per cent.

Dr. J. Wesley Bovée, of Washington, D. C.—I have had three cases of osteofibromyoma of the uterus, in one of which the tumor was removed through the vagina. It was of the submucous variety of fibroid. The tumor so pressed down through the cervix that it required only a slight slitting to get it out, and around the base of it there was considerable bony structure in the body of the uterus near the fundus. It was real bone. There were spiculæ of bone such as we find inside of the calvarium to which the tentorium is attached.

I operated on another case of a similar character within the past few months in which there were two growths lying posteriorly and low down in their attachment to the uterus. They

were about three inches in diameter. This woman was operated upon because of the great deal of suffering she had. I could not account for the suffering from the size of the growths and their position, but as she had had considerable treatment in the course of a year I decided to do an operation with the hope of relieving her, and it proved to be successful in that respect. The growths were quite round, almost absolutely spherical. They were hard, there being bony capsules to them all around, which were solid and required a good deal of pounding with a hard instrument before I could break them. On section the spiculæ ran all the way across the growth, save a few which extended part of the way only.

I do not know anything about the pathological process which goes on in these tumors. Very little is written about it.

APPENDICITIS IN THE MALE AND FEMALE.

By Floyd W. McRae, M.D.,
Atlanta, Ga.

In a very exhaustive article—a review of the history and literature of appendicitis—in the *New York Medical Record*, vol. lvi., page 272, Dr. George Edebohls says: "The literature of appendicitis up to and including the year 1898 embraces more than 2500 journal articles, dissertations, and books, all but a small fractional part of which the writer has consulted in the original." He says: "As regards both the frequency of appendicitis and its relative frequency in the two sexes, the most remarkable and apparently irreconcilable statements are made by various investigators. While the belief is current that appendicitis affects males in larger proportion than females, Einhorn in 18,000 successive autopsies found perforating appendicitis in 55 per cent. of males and 57 per cent. of females, and Robinson in 128 autopsies as they came, found evidences of past peritonitis on or about the appendix in 68 per cent. of female and 56 per cent. of male bodies." Taft is quoted as finding in 300 autopsies 190 entirely normal appendices and 110 appendices presenting more or less evidence of disease. Clinically, Edebohls finds that 4 per cent. of all women have appendicitis. On the contrary, Deaver says that 80 per cent. of all cases occurred in males. Reasons for the relative exemption of females are found in the less frequent exposure to the inclemencies of the weather and other deleterious influences and the better blood-supply of their appendices.

Bland Sutton, in an article published in the *Clinical Record* of London, 1899–1900, vol. xv., page 321, says that

it was formerly believed that appendicitis was almost peculiar to males. The large number of accurate observations relative to disease of the vermiform appendix now available makes it clear that appendicitis is three times more frequent in males than in females. He cites twenty cases in females in which he removed the appendix in a period of eighteen months. These patients all recovered and were known to be alive and well two months after the operation. He says further: "It is a remarkable fact in connection with troubles on the right side of the abdomen, whether acute or chronic, especially in women, that there is often the greatest difficulty in deciding whether they have their origin in the gall-bladder, the kidney, the cæcum, vermiform appendix, ovary, or Fallopian tube." "A careful study of appendicitis in women demonstrates that the clinical aspects of this disease are even more protean than in men. In those women vaguely classed as hysterical, neurotic, or neurasthenic, who complain of indefinite pain in the pelvis, often ascribed to ovarian trouble, the source of the misery is, in a fair proportion of instances, chronic appendicitis."

In the *New York Medical Record*, vol. lvi., page 422, Dr. Villar, of Bordeaux, insists on the frequency of the relation in time between appendicular attacks and menstrual periods. Diagnosis was the important point. Appendicitis might be confounded with an inflammation of the adnexa, and *vice versa*, or they might coexist. He reported several illustrative cases.

Dr. O. Hermes (*Deut. Zeit. f. Chir.*) gathers from the statistics of various authors, as Bamberge, Voltz, Marchal, Paulier, Martin and Fitz, Sonnenberg and Rotter, that in 671 cases 186 were women—that is, 27 per cent. Sonnenberg calculates from his material that about 40 per cent. were women; Tallamon, 35 per cent. He collected from the annual reports of the city hospitals of Berlin all cases of appendicitis, amounting to 1577, of which 949 were males and 628 females—therefore, about 40 per cent. were females. He says, however: "But, indeed, it may be said against a

purely statistical consideration of this question, with much reason, that a defect of its value consists, above all, in this—that in the female sex the appendicitis is frequently not recognized and that so many cases of disease of the appendix vermiformis go under the name of uterine or peri-uterine disease."

I have quoted liberally from these eminent authorities to show the divergence of opinion as to the relative frequency of appendicitis in the male and in the female. In practically all of the cases that have come under my observation in the female mistakes in diagnosis have been made by myself or by the attending physician. Almost all of the attacks have occurred at or about the menstrual time, and most of them have been diagnosed as "inflammation of the tube or ovary." The appendix is frequently a pelvic organ in the female, and is often closely attached to the ovary not only by the tubo-ovarian ligament, but when either the appendix or the ovarian tube has been the seat of inflammation they are found firmly bound together by adhesions, making a differential diagnosis exceedingly difficult.

In Cases VIII. and XIII. the appendix and the right tube and ovary were involved. In Cases VI. and XI. the appendicular trouble was complicated with diseased kidneys. Cases VI. and IX. suffered with recurring appendicitis and attacks of renal colic before or after operation for the removal of their appendices.

I have records of forty-nine cases of appendicitis seen within the last sixteen months, twenty-nine males and twenty females—that is, a little less than 43 per cent. of females. During this period I have operated on seventeen males and fourteen females, or a little more than 45 per cent. of females. I have reported these cases, giving the important details to emphasize the difficulties of diagnosis. In several of them treatment directed to the genitalia had been carried on systematically without giving any benefit whatever, while the removal of the appendix effected a cure. In others the ovary and tubes had been removed and still the symptoms

persisted until relieved by appendectomy. I feel sure that the great disparity in the statistics as to the relative frequency of appendicitis in the male and in the female is due in great measure to mistakes in diagnosis. It is very much more difficult to make a diagnosis of appendicitis in the female than it is in the male. I do not believe that sufficient stress has been laid upon the fact that appendicitis in women usually occurs at or about the menstrual time. Most of us have been accustomed to attribute all abdominal or pelvic pain occurring at this time to some trouble with the genitalia, and this is constantly brought forward in opposition to a diagnosis of appendicitis in this class of cases.

The pain of appendicitis is more sudden in its onset and very much more acute than that of pelvic disease; it is frequently associated with nausea and sometimes vomiting. Muscular tension is usually marked in appendicitis and practically absent in beginning pelvic disease. General disturbance is very much greater and progress more rapid in appendicitis than in pelvic disease. An intact hymen argues very strongly for appendicitis. When in doubt, and the symptoms are aggressive, it is much more safer to make a diagnosis of appendicitis and operate than delay operation until the case is hopeless. Carstens, in the *New York Medical Journal*, vol. lvi., page 17, says: "It is astonishing how frequently physicians will diagnose appendicitis if they are only on the lookout for it. No matter what the abdominal trouble is, or whether the diagnosis is diseased tubes, or gallstones, or renal calculi, intussusception, or invagination, or typhoid fever, I would reiterate what I have said so often: 'In every acute abdominal trouble, no matter if it is in old or young, male or female, look again and see if it is not appendicitis.'"

Operations During Acute Attacks.

Case I.—Miss M. O., aged twenty-seven years, Abbeville, Georgia. Operation, May 18, 1900. No history of previous attack; history of pelvic trouble extended over a

period of several months, for which she had had local treatment. On May 13th she was taken with violent general abdominal pain, nausea, and vomiting; pain soon became localized in the right iliac fossa; temperature ranged from 100° to 103° from the 13th to the 18th. I saw her on the afternoon of the 18th and found a large tumor in the right iliac region. Diagnosis, "perforative appendicitis, with abscess." Immediate operation performed, assisted by Drs. Mayo, Googe, and Maynard: Incision into an abscess containing from eight to twelve ounces of very foul pus; gangrenous appendix contained concretions; appendix removed, pus cavity cleansed, upper portion of incision closed with through-and-through silkworm-gut sutures, and cavity packed with iodoform gauze brought out at the lower end of the wound. Recovery uneventful.

Case II.—Miss S. M., Charleston, S. C. Operation at St. Joseph's Infirmary. First seen in consultation with Drs. Smith and Clark, about April 10th, 1900, at Jackson Hotel. History of previous attack of abdominal pain, occurring at menstrual time, about five days previous. Temperature ranging from normal to 104°; great pain. Marked abdominal tenderness, and muscular spasm greatest in right iliac region. Diagnosis in doubt. On account of aggressive symptoms patient was removed to St. Joseph's Infirmary, where an operation revealed an inflamed appendix surrounded by adhesions and adherent to large abscess involving the right ovary and tube; the appendix, ovary, and tube were removed, the cavity cleansed thoroughly, and the wound closed without drainage. At the next menstrual time the tube on the opposite side became enlarged and the temperature ran up to 103°, but under free saline purgation the inflammation subsided and the patient made a complete recovery.

Case III.—Mrs. E. L. G., West End, Atlanta. Operation at St. Joseph's Infirmary. First seen at her residence, in consultation with Dr. W. B. Parks, June 20, 1900, on the fourth day of the attack. History of two mild, colicky

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attacks, which were not diagnosed as appendicitis. Temperature 103°, pulse 100 to 130; abdomen tender and tympanitic. Diagnosis, "appendicitis, with beginning general peritonitis." Patient removed to St. Joseph's Infirmary, where an immediate operation was performed. Appendix very long and acutely inflamed, with no microscopical perforations; acute fibrinoplastic peritonitis, involving the whole lower segment of the abdomen and pelvis; uterus, ovaries, and tubes normal. Appendix removed and abdominal cavity washed out with a large quantity of hot normal salt solution; fibrinoplastic material washed off with gauze sponges; incision closed with through-and-through silkworm-gut sutures, without drainage. Recovery uneventful.

Case IV.—Mrs. R. I. A., West End, Atlanta. Operation at St. Joseph's Infirmary. Seen in consultation with Dr. M. G. Campbell on June 30, 1900. History of repeated attacks of recurring appendicitis, with more or less constant pain and disability. Abdomen exquisitely tender and tympanitic; greatest tenderness in right iliac fossa. Temperature 102°, pulse 110. Decided on immediate operation and had the patient removed to St. Joseph's Infirmary. Operation at 4 o'clock A.M. on July 1st. Found appendix acutely inflamed behind and to the upper side of the cæcum and embedded in the mesocæcum. Appendix removed with considerable difficulty; local toilet of peritoneum; wound closed in layers, without drainage. Recovery uneventful.

Case V.—A. D., colored, Atlanta. Operation at Grady Hospital. Admitted August 17, 1900. Malaria three months previously; dysmenorrhœa; frequent leucorrhœa for the past year; night-sweats for a month; no previous attack like the present. A week prior to admission drank a large quantity of ice-water; this was followed by general abdominal pain, which soon became localized in the right iliac region; pain constant, with sharp exacerbation; temperature not exceeding 102°. On admission temperature 102°, pulse 120. Pain and tenderness in the right iliac region; muscles tense; slight distention; mass about 3 x 5 inches in the right

iliac region. Operation: Abscess cavity opened, with free discharge of foul-smelling pus; necrosed appendix, containing concretions, removed; cavity sponged out with saline solution and packed with iodoform gauze; drainage-tube inserted; silkworm-gut suture at each extremity of wound; moist saline dressing; free discharge of pus at each dressing. On the 9th cavity irrigated with peroxide of hydrogen and saline solution; tube left out and light iodoform gauze packing of cavity; 10th, dressing partly saturated with pus and slate-colored feces; wound lightly irrigated with boric acid and repacked; 11th, more fecal matter in and around the wound; wound, however, cleaner; most necrotic tissue gone; no fecal matter on the 13th. From this time discharge gradually diminished, wound closing to unhealthy granulations, about one-quarter inch deep, which were curetted and sutured on September 10th. Discharged, cured, September 19th.

Case VI.—Mrs. P. H. C., Atlanta. Operation at St. Joseph's Infirmary. First seen in consultation with Dr. Charles E. Boynton, September 11th. History of one or two mild, colicky attacks. Temperature 101°, pulse 100. General abdominal pain. History of violent pain, with nausea and vomiting and subnormal temperature, followed by gradually rising temperature and increased pulse-rate. Patient removed to infirmary. Operation, September 12th: Appendix bound down by adhesions and acutely inflamed; removed and wound closed in layers. Recovery uneventful. Has had one attack of renal colic since, passing three calculi.

Case VII.—I. D., aged twenty years, Atlanta. Operation at Dr. Stockard's private infirmary. First seen in consultation with Dr. Stockard and Dr. Lukens, November 1st. No history of previous attack. Was taken with violent abdominal pain concurrent with menstrual flow. Pain and tenderness low down in pelvis, just above and to the right of pubis, but gradually extending upward into the loin. Diagnosis in doubt. Operation suggested, but delay insisted upon; marked increase of all the symptoms; patient removed

to Dr. Stockard's private infirmary. Operation on morning of November 4th: Large, gangrenous appendix containing concretions and three perforations, surrounded by an abscess containing about eight ounces of very foul pus; several large black spots on the cæcum; appendix removed and upper part of incision closed with through-and-through sutures; drainage left at lower end. Patient is getting on nicely, with small fecal fistula remaining, which is daily diminishing in size.

INTERVAL OPERATIONS.

CASE VIII.—Mrs. W. C. T., Isabella, Tenn. Operation at Dr. Stockard's private infirmary. First operation, October, 1899, for ruptured tubal pregnancy. Recovery, with persistent fistula where drainage had been left. Second operation, May 10th. Fistulous tract dissected out and cyst of broad ligament removed, together with a chronically inflamed and very much enlarged appendix surrounded by dense adhesions and adherent to the broad ligament cyst. The diagnosis of this case at the time of the first operation was "acute appendicitis with abscess," and the recovery from the first operation was exceedingly tedious. The patient, who was profoundly septic at the time of the operation, recovered very slowly, with characteristic septic temperature and pulse for several weeks; whether appendicitis existed at this time or not I am unable to say. Recovery from second operation tedious, but uneventful and complete.

CASE IX.—Mrs. F. M. H., Atlanta. Operation at Grady Hospital; admitted May 20, 1900. Eight or ten weeks previous to admission she had some pain in the right side of the abdomen; urine contained much sediment, and it was thought she had passed a small calculus from the bladder. Last January she had an attack, with pain in the right iliac region, nausea, and vomiting for two weeks; from this time she lost considerable flesh, had almost constant uneasiness in the right side of the abdomen, and three slight attacks as in January, pain being principally posteriorly. One week before admission pain was more severe than ever before; some distention;

general abdominal tenderness, more marked about McBurney's point, and frequent nausea. The urine for a year contained much pus at times, but not especially so during attacks of abdominal pain. Temperature and pulse varied little from normal, being 98° and 88° on admission. Operation, May 21: Appendix found bent upon itself, lying backward and outward, behind cæcum; mesoappendix one-quarter inch thick; varicose veins on the appendix and recent adhesions between the appendix and intestine; appendix removed; gridiron operation. Recovery uneventful. She subsequently passed two renal calculi, since which time she has been in excellent health.

Case X.—M. I., colored, Atlanta. Operation at Grady Hospital; admitted August 3, 1900. Has had attacks like the present since December, 1899, always within a few days of menstrual flow, either before or after. This was the worst attack. Taken sick three days before admission with faintness and abdominal pain below umbilicus and in right iliac region; pain has not been general; vomited once after taking medicine on the night of onset. On admission, temperature 101.2°, pulse 100, respiration 22. Slight tenderness in right iliac region; no distention; mass of size of index-finger running obliquely downward and inward from McBurney's point. Slight thickening of left tube; retroversion. Temperature and pulse remained after day following admission; bowels kept open by occasional doses of salts; some tenderness remained in the side, with occasional pain. Operation, August 20th: Two-and-a-half inch incision slightly to outer side of McBurney's point (gridiron); appendix found in the position as mass felt externally; vessels of appendix congested; two slight strictures and small band of adhesions; tied off with catgut No. 1 and peritoneal cuff dissected back; appendix tied off with kangaroo tendon, stump cauterized, etc., end brought together with five catgut sutures, and peritoneum stitched over with same; kangaroo tendon and catgut closure; primary union. Discharged, cured, September 8, 1900.

Case XI.—Mrs. J. D. P., aged thirty-five years, Griffin, Georgia. Operation at St. Joseph's Infirmary, October 21, 1900. A large, chronically inflamed and adherent appendix removed and a floating kidney stitched back through the same incision; stab-wound in loin for drainage; incision closed in layers. Recovery uneventful.

The history of this case preceding the operation is exceedingly interesting. Mrs. P. had suffered for years with chronic indigestion and abdominal pain, but never accompanied with much rise of temperature or other constitutional disturbance. Diagnosis of "kidney disease" had been made, and she had received local treatment without benefit. The appendix was so enlarged that it could be felt very readily through the abdominal walls, and the kidney was easily movable. I am inclined to think that the floating kidney preceded the appendicitis, probably bearing a causative relation thereto.

Case XII.—Miss I. H., Atlanta. Operation at St. Joseph's Infirmary. History of attacks of pain, coming on at each menstrual time, for three or four years, sometimes so severe as to require morphine for its relief. Had had two attacks of abdominal pain, with nausea and vomiting and marked collapse, one of which was followed by a great deal of general disturbance and fever for several days. The family physician made a diagnosis of "inflammation of the right ovary and tube." I saw the patient independently of the family physician and made a diagnosis of chronic appendicitis, with probable involvement of the right tube and ovary, and advised operation. Operation was done November 1st, and a very small but much inflamed appendix was found low down in the pelvis attached to the right ovary. Ovary and tube normal. Recovery uneventful.

Case XIII.—Miss B. C., aged twenty-one years, Atlanta. Operation at "The Halcyon." Seen in consultation with Dr. Summerfield. There was a history of indefinite abdominal pain extending over a period of about two years, involving the whole right side from the liver to the pelvis. No

definite diagnosis was made and an exploratory operation was advised. Operation, September 7, 1899, assisted by Dr. Summerfield and Holmes. The appendix was chronically inflamed, adhesions extending from the cæcum to the liver upward and down into the pelvis, involving the right tube and ovary. The right ovary was as large as a lemon, and the tube thickened and distended. The appendix, tube, and ovary were removed. Patient made a tedious recovery, developing a left saphenous phlebitis about ten days after the operation.

DISCUSSION.

Dr. J. B. S. Holmes, of Atlanta, Ga.—Mr. President: As having a direct bearing upon the paper of Dr. McRae I would like to report briefly three cases, two of them illustrating very forcibly the necessity of always examining the appendix when the abdomen of a woman is opened for any cause.

The first patient gave a history to the effect that fifteen years ago she had an attack of peritonitis. From that time she has suffered from ill health, and twelve years ago Dr. Robert Battey removed both ovaries and tubes, but she obtained no relief whatever. She continued to suffer from indigestion, intense abdominal soreness, inability to stand without severe backache, and a drawing sensation in the right lumbar region. She came to me, and I confess I did not diagnose appendicitis in her case, but told her that she undoubtedly had adhesions from some cause. She readily consented to an exploratory operation. I found no adhesions in the pelvis, but the appendix had doubled upon itself and was firmly fastened high up at the junction of the mesocolon with the abdominal wall, so that she was unable to walk or stand. I removed it, and I am glad to say that her health since then, five years ago, has been excellent. This condition existed at the time the ovaries and tubes were removed. The appendix was not examined at that time or the trouble would have been ascertained.

The second case came under my observation about eight months ago. The patient gave a history of pelvic inflammation about fifteen years previously, and the same surgeon removed both ovaries and tubes without benefiting her. She had been

practically an invalid since. She could neither stand erect nor sit erect very well. She suffered from constipation, indigestion, and headache. I opened her abdomen for the same cause, suspecting the existence of adhesions. Her case was particularly interesting, in that the appendix had attached itself very low down in the pelvis to the end of Douglas' cul-de-sac, about an inch of it having been completely obliterated, and the constant traction upon it in her efforts to stand erect had drawn out the band of tissue nearly three inches, which was about the size of a pencil. The colon was pulled down all the while when she attempted to stand. Removal of the appendix was followed by complete relief.

These two cases emphasize the importance of examining the appendix always, whenever the abdomen is opened for any cause, to see whether there is anything wrong with it as well as with the pelvic organs, and I make it a rule now to examine the appendix, and if I find the slightest trouble I remove it.

The third case I wish to report briefly is a patient, aged thirty-six years, married a year, no history of pregnancy, with excellent health up to last May except for the five or six months prior to that time, when she suffered from a profuse though regular menstruation, and was seized in May with a violent pain in the right iliac region. She had quite a severe illness; fever continued for some time, and she has been confined to her bed from that time until now. She came to me two and a half weeks ago, very greatly emaciated, with a well-defined tumor in the abdomen, which I have here, and, with the permission of the Association, I would like to exhibit. She suffered from intense tenderness and disordered digestion, the temperature ranging from 99.5° in the morning up to 101° in the afternoon, with occasional rigors. On Wednesday last her temperature suddenly jumped up to 104°, pulse 130. I watched her carefully that afternoon and operated the next morning. When the abdomen was opened the pelvis was filled almost entirely with a uterine fibroid. The right ovary was considerably enlarged. Springing from the fundus of the uterus was a fibroid attached by a pedicle a little larger than my thumb; covering the entire fibroid the omentum had been pulled over it as a curtain. The colon from the sigmoid around was attached in its entirety. The appendix evidently had attached itself to the fibroid and had

infected it, and the fibroid, when Dr. Kelly opened it last night, was filled with pus. She had had a severe peritonitis in May, cementing firmly the entire omentum and all of the colon. On Wednesday last she had an exacerbation of inflammation there and the appendix had just begun to leak, hence the high temperature on that day. When the abdomen was opened I applied two heavy clamps to the pedicles, cut them, and with very great difficulty peeled off the omentum covering the whole tumor, and after a long and tedious dissection succeeded in liberating the colon in its entirety without opening the bowel; but I tore in one place the capsule of the tumor and allowed quite a considerable quantity of pus to escape. The appendix was softened and broken down with inflammatory action, so that it was impossible to remove it except piecemeal. It, however, was taken away and tied off with catgut and carbolic acid applied. In attempting to remove the ovary a mass of pus and broken-down blood was thrown out in the pelvis. I intended to do a hysterectomy, but simply removed the other ovary, as she was too weak to bear more. She was completely eviscerated; notwithstanding we were extremely careful, large areas of bowel were more or less infected. I used five pints of Marchand's pure peroxide of hydrogen over the intestines, washed them off with three gallons of hot salt solution, drained with gauze through the vagina, and closed the wound. She has gone on uninterruptedly without any trouble, her temperature at no time having reached above 101° since the operation. She was so profoundly shocked that we had to use strychnine and saline solution to save her life.

I have mentioned these cases to show that appendicitis in the female is frequently obscure. Appendicitis had not been suspected by the attending physician and really had not been by me. I knew she had septic trouble, but I did not suspect appendicitis.

With the permission of the Association I would like to exhibit the tumor with its attachments.

Dr. Hal C. Wyman, of Detroit, Mich.—Apropos of the doctor's paper I would like to recite an observation made but a few days ago. It is a case of extra-uterine pregnancy which came under my care. I performed an operation for the removal of the fœtus, which had apparently died at about the end of the

seventh month. The operation was done about thirteen months after the appearance of the first symptoms of pregnancy. In this case the appendix vermiformis was found intimately blended with the fimbria of the right Fallopian tube. The left tube had also suffered some disease. It was not removed because there was no particular indication for its removal. But the right Fallopian tube was involved in the appendix by dense inflammatory adhesion, so it occurred to me that in consequence of this blending there had escaped the impregnated ovum, and I think we may justly charge some of the cases of extra-uterine pregnancy to adhesions between the fimbriæ and the appendix vermiformis. In this case the appendix was about three and a half inches in length; it had a number of scars; it was hardened about its end and at the point where union with the fimbria occurred.

Dr. Howard A. Kelly, of Baltimore, Md.—I had an interesting experience some six years ago when I was called to Cambridge, Md., by Dr. Goldsborough to see a woman suffering from acute peritonitis. It was impossible to decide at the time whether she had an appendicitis or whether the peritonitis was due to pelvic suppurative disease. After opening the abdomen I let out a quart of sero-pus from the pelvis and found a sloughing gangrenous appendix and a gangrenous right ovary. The disease, involving both structures, had originated in the appendix. The patient recovered and got up, and then died suddenly at the end of the month from the rupture of a subphrenic abscess into a bronchus, causing suffocation.

The relation between appendix and uterine tube and ovary in these cases is interesting. We may have primarily a disease of the appendix which extends to the ovary and tube or *vice versa*, or we may have coincidently both ovary and appendix diseased at the same time, and I observed each of these conditions.

I have been so much impressed with the importance of this relationship for some four years past that I have printed on my anæsthesia slip at the Johns Hopkins Hospital a query as to the condition of the appendix. The anæsthetist always asks the question if I do not remember to give it to him, and records the answer.

My own statistics under this head are that during the past four years I have removed 150 appendices, and of this number

sixty cases were associated with and involved in pelvic inflammatory disease. I found the appendix adherent to myomata in twelve cases out of 150; adherent to ovarian tumors in nine cases. I found carcinoma of the appendix secondary to ovarian carcinoma, without any traceable macroscopical relation, in one case and a tiny primary carcinoma of the appendix in another. I found tuberculosis in the appendix secondary to tuberculosis in the tubes and ovaries in three instances, making eighty-six instances in all in which the appendix was associated with other disease. In the remaining appendicular cases—sixty-four—there were calculi, cystic disease, and uncomplicated appendicitis, etc. I present these statistics to show how important the matter is.

Dr. Lewis S. McMurtry, of Louisville, Ky.—As illustrating one phase of this subject in connection with the association of appendicitis with diseases of the uterus and its appendages, I desire to mention briefly a case. I enucleated an ovarian cyst from a woman, aged thirty years, who had not been operated upon. For some time she had had a typical acute perforative peritonitis, followed by septic symptoms, the disease being quite limited as to the area of peritoneal involvement. When the abdomen was opened it was found that the appendix had perforated the ovarian cyst, infecting the cyst, illustrating the fact that the presence of one disease may be conservative. The life of the patient was preserved by the presence of the ovarian cyst. Instead of perforation of the appendix into the general peritoneal cavity the perforation occurred into the ovarian cyst, and in that way limited the infection to the ovarian cyst.

Dr. Willis F. Westmoreland, of Atlanta, Ga.—I desire to say a few words in connection with Dr. McRae's paper, but more particularly in reference to the case upon which he operated and in which he anchored the kidney through the same opening that he removed the appendix. This is not only a feasible operation, but a practical one. As regards the difficulty in the technique, the needles he had were not suitable for the case, and I think with a needle made for that particular purpose the difficulty of the technique would be removed to a great extent. As a matter of selection in ordinary cases I do not think I would make a posterior incision; but there is no question that the

kidney can be carried back and anchored in the manner Dr. McRae has described, and a needle made for that purpose will obviate the greatest difficulty connected with the operation.

Dr. W. L. Rodman, of Philadelphia, Pa.—I do not wish to discuss the paper itself, as I did not hear it, but desire simply to refer to the point mentioned by Dr. Westmoreland. It was my privilege to see the patient referred to yesterday, four weeks after the operation, and she stated that she had been absolutely relieved of all symptoms. Furthermore, she stated that her friend had been entirely relieved by the operation which she underwent some years ago. An examination of the kidney in this case demonstrated the fact that it had been well anchored by the suturing, so that the operation is not only practicable, but we are under obligations to Dr. McRae for calling attention to it. Without doubt the two operations can be done through one incision.

Dr. William P. Nicolson, of Atlanta, Ga.—I have only a few words to say. As I do no gynecological work, my observation of these cases is like that of Dr. McRae, and I have seen only those patients who have simply come into my hands as a general surgeon. I desire to call attention not so much to cases of coincident disease of the appendix and uterine adnexæ as to those in which all the symptoms for years have been attributed to uterine or ovarian trouble, and where operation has demonstrated that the appendix solely was at fault.

I saw a case several years ago in which Dr. McRae was the consultant with me, and in which he kept me from operating for a month by insisting that the case was one of tubal and ovarian disease. The woman had been curetted twice. The attending physician called upon me once to assist him in removing both ovaries, and I held him off at that time. During a subsequent attack her attending physician and I saw her together. Dr. McRae based his opinion largely upon the fact that there was no abdominal spasm upon that side and that there were symptoms of hysteria associated with the case. As I have previously said, he kept me from operating for two or three weeks because I had great confidence in his judgment. Finally, I operated almost against his judgment, and found the trouble located in the appendix. Both ovaries and tubes were examined and found normal. Patient was partially restored to health

and remained in good condition for some time, until she was operated upon eighteen months afterward for ectopic pregnancy. She is now in perfect health.

I saw another patient two months ago, near the State of Florida, who had been an invalid for five years. Her ovaries had been treated; her uterus had been curetted and tamponed for years. I made a diagnosis of chronic appendicitis, and in order to satisfy my own mind I had Dr. Holmes see the case. We found no trouble with the ovaries or tubes. I removed the appendix and found it practically free from adhesions, but she had a typical interstitial chronic appendicitis. Attention was directed to her ovaries because at each menstrual period she suffered such intense pain over the region of the appendix. I removed the appendix on Monday morning at 9 o'clock, and on Tuesday night following menstruation came on, for the first time comfortably in six years. She had not a particle of pain; she passed through her menstrual period without any disturbance or headache, and has remained free from pain since that time, which was nearly two months ago.

The next case I operated on, a week after that, was a woman who had the coincidence of movable kidney and a tender appendix. I saw her in October, 1898, and believing the kidney was the most important condition to deal with (Dr. McRae had not then made the operation he has described) I stitched her kidney to the wound, and all her pain above a certain line was relieved; but she remained an invalid, and had constant nausea and pain in the region of the appendix. There was no history in this case of the woman ever having had an acute attack of appendicitis, nor could I elicit any history of an attack of colic, and the diagnosis was made upon the tenderness of the appendix. The appendix was comparatively free from adhesions excepting that it was bent at one point. The appendix was removed four weeks ago to-day. She has never had any nausea since and has been free from all pain. Menstruation has come on since that time, and she has had no trouble.

These cases have impressed upon my mind the misfortune of having our eyes directed to a woman's ovaries for every organ that may be at fault in the abdominal cavity. This is the great tendency of all pains in the lower part of the abdominal cavity.

As far as the frequency and recurrence of appendicitis in the

female are concerned, in my experience it has occurred in 50 per cent. of all I have seen. I have operated on fifteen women. I found in two women a condition that I have never before seen in the dissecting-room or on the operating-table, although I have taught anatomy for twenty-two years, and that is an enormous amount of loose large intestine in the right iliac fossa. In these two women upon whom I operated I withdrew from the wound eighteen inches of loose large intestine, with large attachment so that the entire intestine could be removed, and had great difficulty in finding the appendix because it kept going up and down. In those cases the cæcum seemed to be pulled up out of the pelvis. I have seen a similar anatomical peculiarity in one male patient. It is new to me, because it is not mentioned in any work on anatomy.

Dr. George Ben Johnston, of Richmond, Va.—I have listened with a great deal of interest to Dr. McRae's paper, and also to the discussion on this subject. I am quite convinced that appendicitis occurs quite as often in the female as it does in the male. I believe that we see fewer cases of fulminating appendicitis in the female than we do in the male, but that of chronic appendicitis we see just as many cases in the female as we do in the male. I have seen numerous cases of chronic appendicitis associated with movable kidney, and it sometimes becomes a question of great importance to settle which is the cause of the distress for which the patient consults the surgeon —the diseased appendix, or the movable kidney, or both; but it is such a common thing for the two conditions—movable kidney and chronic appendicitis—to be associated with each other that oftentimes I keep patients under observation for many days, perhaps weeks, to determine which is the more distressing condition. Edebohls has called our attention to that fact in a valuable paper written some time ago—a fact which I had already observed. I consider his paper a valuable one because it emphasized the importance of investigation of these points. I do not know of any malady which is so erratic in its behavior as chronic appendicitis in the female. I do not know of any condition in which there is such variance between the pathological condition and the symptoms as in chronic appendicitis in the female. We very often find when the appendix is exposed very little pathological change, yet the symptoms in the case have

been of a very aggravated form, in that they have caused a great deal of trouble and suffering. Removal of the appendix cures the patient, and nothing but a painstaking study of the removed appendix would indicate that there had been any disease of this organ. Macroscopically, the appendix is found to be but little diseased. I am convinced that a great many women are mutilated and have their ovaries and tubes improperly removed because of the fact that their suffering is referred to these organs by an unripe surgeon or a practitioner who is not painstaking enough to differentiate between appendicial trouble and trouble in the tubes, the ovaries, or movable kidney.

I did not operate on the patient that Dr. McRae reports as his eighth case, I believe. If I had operated upon her and had removed the ovaries and tubes he would have been spared the trouble of operating on her appendix, for the reason that I am a little peculiar in this regard. Whenever I get a chance at the appendix I remove it. If I had operated on that woman I would have taken out her appendix, because it adds but two or three minutes to the operation, and in doing an operation in the abdominal cavity it adds nothing to the gravity of it to remove the appendix. I do not need to keep a slip to state the condition of the appendix, as Dr. Kelly does, because when I remove an ovarian tumor or fibroid tumor of the uterus, or anything in the neighborhood of the appendix, I remove the appendix too.

The procedure which Dr. McRae describes of having sewed the kidney through the anterior abdominal wound is one which Dr. R. Harvey Reed, of Columbus, Ohio, practices. Reed makes an incision, exposes the kidney, passes sutures through the kidney, brings them out on the back, and ties them. Finally, he cuts the outside sutures and withdraws them after ten or fifteen days. I do not approve of that method of operating for movable kidney. It is not a good method. There are better methods, and there is a much easier method to practice than the one which Dr. McRae has proposed, because the surgeon has the point of election in making the incision. The doctor makes his incision to fit any case. One can make the operation upon the kidney a secondary one; therefore, you have no such latitude in the performance of the operation as that when you start by design to fix a movable kidney. In this class of cases it is my practice to remove the diseased appendix first,

and after a while, when the patient has completely recovered from that operation or after the symptoms have completely subsided, to fix the kidney by the lumbar route. Of course, the method pursued by Dr. McRae was not only eminently satisfactory but ingenious, and one which is to be commended. The appendix is oftener at fault in this class of cases than the kidney. Hundreds of movable kidneys give no distress at all. Many women are not conscious that they have movable kidneys, and they may go on unaware of it unless some anxious person reveals it to them. It is only in cases in which there is suffering that women ought to be made aware of the fact that they have movable kidney. In some cases I remove the appendix, and if the symptoms do not subside later on I fix the kidney.

Dr. McRae (closing the discussion).—I am glad that my paper has elicited such a free discussion. Dr. Holmes' cases are exceedingly interesting, and are along the same line as the cases I have reported. One of my cases—Case IX. if I remember correctly—is right in line with the case reported by Dr. Wyman. I operated upon the patient May 10th of this year; in October prior to that I was called by Dr. Stockard to see the case, which had been diagnosticated as appendicitis, with localized abscess. I was not sure, but I felt from the history of the case that we had to deal with a ruptured ectopic pregnancy with an abscess, or sepsis from that. I opened the abdomen and demonstrated that it was a ruptured ectopic gestation, and treated the case accordingly. The woman was intensely septic; she had delirium at that time. The septic condition deepened after operation. She made a tedious partial recovery. She never did get well, and came back to me the following May for another operation. I expected to have an easy time in cleaning out the sinus, but found coils of bowel attached to it and tore one or two holes in the small intestine. I found an intraligamentous cyst of the right broad ligament. The appendix was also markedly diseased and had been the cause of constant pain and trouble, and her profound septic condition and slow convalescence were possibly due to appendicial trouble coexisting with ruptured ectopic gestation.

Dr. Kelly's statistics are interesting. Dr. Westmoreland and I discussed the advisability of doing appendectomy and nephrorrhaphy through the same incision and whether it was better or

not to do these operations separately. I think the method I pursued in my case was better than the one carried out by Dr. Reed, and it is different.

Dr. Nicolson mentioned one case of interest. I happened to be out of town at the time he had the opportunity of operating on this patient, but if I had been in town I might have kept him off. He did not mention one important fact, that he and the consulting physician made a vaginal examination and I did not. I took their word for what was in the pelvis together with the history of the case. I was mistaken in that case, as I was in several of these cases, and it is for this very reason that I have presented this paper. I am willing to acknowledge my mistakes, and I trust that this paper will call attention of others to their mistakes.

The woman referred to upon whom I did an appendectomy and nephrorrhaphy had had her appendages removed long before she was in Dr. Johnston's hospital.

DRAINAGE IN ABDOMINAL SURGERY.

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Many of the problems involved in abdominal surgery have been settled, not always in the same way by different men, it is true; but by a general consensus of opinion, the outcome of our gradually accumulated knowledge, many of the procedures incident to this department of surgery have been agreed upon.

For instance, every surgeon agrees and insists that his hands, instruments, the field of operation, etc., must be clean, surgically clean; and it does not matter whether a man believes in "bugs" or not, he says "you must be clean;" nor does it differ whether he scrubs his hands until the superficial epithelium slips, dyes and bleaches them in strong chemicals, or merely scrubs his hands and rinses them in alcohol, for he invariably insists that you must be clean. Not only is "cleanliness next to godliness" in surgery—it is godliness itself.

While some surgeons make a short abdominal incision and others a long one, all agree that the incision should be sufficiently ample to allow the operator to work easily and expeditiously.

While some surgeons employ silk ligatures within the abdomen, others use catgut; some steam their silk fractionally, others boil it one time only, still others do both; some sterilize their catgut by dry heat, others cumolize it—yet all maintain that whatever material is employed and by whatever process it is prepared it must be absolutely sterile, non-irritating, easily absorbed, and of the smallest size commensurate with safety.

Further, we all agree that loss of blood is the chief factor in the production of surgical shock.

I dare not include in this category of agreements the various methods of closing the abdominal incision, for if the gentlemen who practice the different methods of closing the abdomen were to suddenly agree we might be forced to draw the inference that the new waiter did at the medical banquet. You have all heard the story. After several courses had been served the new waiter said to the old waiter: "I believe these doctors are getting intoxicated." The old waiter replied: "I don't see any signs of it." The new waiter said: "I don't either, except that they are all beginning to agree with each other."

Touching many other points there is a general consensus of opinion. Why can we not settle upon some well-defined principles in the matter of abdominal drainage? To this end I have invited the attention of this distinguished body. Ever since Robert Houston, in 1701, incised the abdomen of Margaret Millar and "left a small tent in the lower angle of the wound," drainage has been considered a question of prime importance in abdominal surgery. Indeed, incision and drainage were about all that surgeons dared to do until the immortal McDowell deliberately removed a tumor from Mrs. Crawford in 1809.

That drainage is essential and desirable in some cases is very evident; that it is unnecessary and undesirable in many cases is equally clear.

Let us then consider briefly

The Objects of Drainage.

The chief purposes for which drainage is employed are as follows:

1. To drain away existing septic material.
2. To afford an exit for the sepsis when the operator fears he has possibly infected his patient.
3. To promote adhesions and thereby wall off weak spots from the remainder of the abdominal contents.

4. To keep the peritoneal cavity free from blood and other fluids.

5. To allow of a more certain knowledge of the conditions present within the abdomen.

6. Gauze drains are sometimes employed as tampons to control hemorrhage.

1. *To Drain Away Septic Material.*

There can be no question of the propriety of drainage in those cases where sepsis is already present. Dr. Price has emphasized its value in cases of suppurating appendicitis, which may be taken as typical of septic cases; but it is to be noted when we come to apply this rule of action to other cases presumed to be already septic that the surgeon who does not follow a routine formerly drained many cases which he now feels safe in closing without drainage. By way of illustration, take the following recent case occurring in the hands of the writer:

Mrs. S., a very small woman, aged twenty-three years, white, was delivered of an average-sized child forty-eight hours before she was seen by the writer; condition only fair; pulse 120, temperature 101°; emaciated; abdomen moderately tender and greatly distended with an ovarian cyst. A few days' delay was advised. After ten days abdominal distention was increasing and respiration beginning to be embarrassed. Contrary to the writer's usual custom, he tapped the abdomen, drawing off thirty pints of heavy, gelatinous fluid. This relieved the dyspnœa, but the evidences of sepsis continued. After a few days, the patient having gained a little strength, she was taken to more comfortable quarters and the tumor removed. The tumor when removed weighed thirty-three pounds, which added to the thirty pounds removed by tapping a few days previously made sixty-three pounds. The tumor and pregnant uterus probably weighed as much as the woman. The cyst was multilocular, containing many different kinds of fluid. Adhesions were numerous, and evidences of widely spread peritonitis

were present. The peritoneum was soiled by a quantity of the fluid escaping into the abdominal cavity, due to the cyst walls being friable and easily torn. The abdominal cavity was thoroughly washed and left filled with salt solution and the incision closed without drainage. The recovery was perfect. Formerly it would have been considered necessary to drain this case because of the sepsis and peritonitis.

Nor is it always necessary to drain after removal of pus-tubes even when the sac ruptures and the parts are bathed in pus, since it is well known pus is frequently free from pathogenic germs. This is specially true of old pus-tubes. Even the presence of some form of pathogenic germs, notably the gonococci, is not always an indication for drainage.

The principle of drainage in septic cases is especially applicable when we invade the peritoneum through the vagina. Indeed, in these cases, as in suppurating appendicitis, the chief object is to drain the pus foci and serum-distended tissues. Here we have ideal drainage, for gravity aids capillarity, and it is oftentimes marvellous how quickly these patients improve.

2. *When the Operator Infects his Patient.*

After the earlier operators got over their dread of opening the peritoneum, surgeons gradually learned that merely opening the peritoneum was a perfectly safe procedure, provided the operator's hands and implements were sterile. In this day it is almost inexcusable for a surgeon to infect his patient, yet almost all of us have said, "If we handle the parts a great deal it is better to drain," unmindful of the fact that we are virtually admitting that we have probably infected the patient.

With instruments, sutures, and sponges thoroughly sterile, with our hands conscientiously scrubbed and washed in chemicals, and with the use of rubber gloves—prolonged handling of the parts ought not to be an indication for drainage.

However, the unexpected occasionally happens.

Last month, while the writer was doing a hysterectomy

in a private home in a distant city, the patient suddenly stopped breathing, and she looked as though all the blood in her body had suddenly side-tracked itself into the capillaries and was determined to stay there. It required prolonged efforts at artificial respiration with the patient in the inverted position to establish breathing, and but for the intelligent, faithful efforts of professional friends she must have died. The writer was kept busy trying to protect the open abdomen. Of course, chloroform was the anæsthetic used. A friend of mine had just lost a patient from chloroform a few days before.

After this anæsthetic episode everything went wrong, as usually happens when one thing gets awry. The outcome was that when the operation was finished we did not know whether the patient was infected or not. For fear that she was, drainage was employed. The recovery was stormy but satisfactory in the end.

3. *To Promote Adhesions and Wall off Weak Spots.*

The well-known property of the peritoneum to throw plastic lymph around any foreign body is often utilized when after injuries to the bowel, ureter, or other viscus there is fear of leaking and consequent contamination. The gauze drain here serves the dual purpose of isolating the vulnerable part and drainage.

4. *To Keep the Peritoneal Cavity Free from Blood and Other Fluids.*

Just here is a point of departure. One school cites the fact that blood or serum, or indeed any innocuous fluid, when retained in the abdominal cavity makes an excellent culture medium, and claims that the way to prevent infection is to keep the peritoneal cavity free from fluids. Even when hemorrhage has been controlled advocates of this plan expect in most cases, especially where many adhesions have been

broken up, that there will be enough oozing to require drainage. They generally employ a glass drain and empty it frequently with a long-nozzle syringe.

The other school takes the position that the peritoneum is amply able to take care of any reasonable amount of oozing blood, or, in fact, a large amount of other fluid even if there be mild infection present; and they encourage this absorptive function of the peritoneum by leaving in its cavity a liberal quantity of normal salt solution, which is not only easily absorbed itself, but dilutes the oozing blood and renders it more readily absorbed. Those who follow this teaching close the abdomen without drainage, no matter how many adhesions have been broken up or how much fluid is left in the peritoneal cavity.

5. *To Allow of More Certain Knowledge of the Conditions Present within the Abdomen.*

This argument is used in favor of the drainage-tube particularly in cases where there are great fears of hemorrhage. It must be conceded that hemorrhage occurring within forty-eight hours after operation may sometimes be detected by means of the drainage-tube and syringe. The same is true of the gauze drain to a less degree.

The objection to this argument is that in the vast majority of cases it is unnecessary to inspect the abdominal cavity to see if there is hemorrhage. The use of suture material that will not readily break or untie, and careful inspection of every possible bleeding-point, ought to insure against hemorrhage. Certainly this is true in all cases in which the tissues are not softened by sepsis or malignancy.

6. *Gauze Tampons.*

There are a variety of circumstances in which it is expedient to pack a bleeding-point with a gauze tampon to control the hemorrhage. In these cases the gauze, of course, also acts incidentally as a drain.

Histology and Physiology.

Many of the reasons advanced in favor of drainage were promulgated before the histology and physiology of the peritoneum were understood.

Wegner, in 1877, was the first to demonstrate the wonderful ability of the peritoneum to absorb fluids, even to the amount of the entire weight of the animal in twenty-four hours.

Muscatello, in 1895, proved that while there were no stomata between the peritoneal endothelium, that fluids and minute foreign bodies passed readily between the endothelium of the diaphragmatic peritoneum by a retraction of the cell protoplasm; from thence they were taken up by the open spaces found only in this portion of the peritoneum and passed on into the lymph circulation. This observer also demonstrated a normal intraperitoneal current capable of carrying fluids and small bodies to the diaphragm, and this, too, irrespective of position, though gravity has a marked influence on the current.

It has also been shown that the leucocyte is the principle bearer of foreign particles along the channel just described.

Another fact pertinent to the question is that the leucocytes and other factors producing this intraperitoneal current bear off pathogenic bacteria along this wonderful highway as readily as they carry innocuous substances, provided the enemy be not too numerous or too virulent.

These facts open up to our view the surprising capabilities of this highly vitalized membrane, and the abdominal surgeon should doff his hat to his ablest ally—the peritoneum.

Objections to Drainage.

Excluding cases of acute suppurative infection, such as appendicitis, pelvic abscess that can be reached through the vagina, and wide-spread general peritonitis, drainage is objectionable for many reasons, among which are the following:

1. Drainage is deceptive.

The writer has tried all kinds of drainage and found them unsatisfactory. Its use is not a guarantee against infection —the ever-present menace to the patient. In fact, both gauze and the glass tube constitute an additional source of infection.

2. Cases not drained do better.

The observation of any considerable number of cases will demonstrate this. A smaller percentage of the patients become infected, they suffer less nausea, less pain, require less morphine, have less tympany, the bowels are more easily moved, the mortality is lower, and, in a word, they do better than cases that are drained.

3. Drainage is neither scientific nor workmanlike.

I say this with an apology and all due deference to those distinguished gentlemen present who drain most of their cases.

Take a case of large myoma or pus-tubes with adhesions. To drain such a case is to say in substance to our patient: "We cannot open your abdomen, remove the abnormal growth, separate the unnatural adhesions, and close your abdomen without leaving your peritoneum in a condition that requires an open door." The "open-door" policy is all right for China but not for the peritoneum. The presence of a drain is a tacit admission that we have left something undone or that we have done something that we ought not to have done. Even in a case of suppurative appendicitis or pelvic abscess if we could enucleate the sac in its entirety and without contaminating the surrounding tissues, just as we do in a simple pus-tube, there would be no need of drainage; but since this cannot be done we must content ourselves in all such cases with less complete work and leave nature to finish the job. Price, of Pennsylvania, once made the remark that drainage is an evidence of imperfect and incomplete surgery. In other words, we drain certain cases because we cannot do any better.

DISCUSSION.

Dr. Manning Simons, of Charleston, S. C.—Mr. President: I have listened with a great deal of pleasure to Dr. Long's paper; he has gone into the subject very carefully, and in the main I agree with the conclusions reached by him. There are some of us, however, who would be inclined not to admit that the leaving of a drainage-tube in suppurative cases is an evidence that we have left something that we ought to have removed or that we have done something that we ought not to have done. I apprehend that there are many cases in which suppuration is not confined to the tubes, but has diffused itself more or less over the pelvic and the abdominal cavities, where one's conscience would scarcely allow him to close up all avenues of escape for the reaccumulated fluid to make its way from the cavity. Drainage is applicable to such cases as those where, through our inability to remove the area which has given rise to pus, such pus will reaccumulate provided we do not make an arrangement by which it can escape from the cavity. It seems to me that drainage should be limited precisely to those cases in which we are unable to remove all of the suppurating surfaces; where we are not able to remove the involved area in a case of suppurative appendicitis from which the pus comes then we are not justified in closing the cavity. There are few of us who in operating upon a case of suppurative appendicitis would undertake to break down and tear out the protecting wall that has been thrown up by nature to wall off this septic accumulation. Under those circumstances drainage is our only salvation. There are some cases in which we are not justified in closing a wound to any extent, taking all subsequent chance of protrusion of viscera at that point. In a case where we can leave a clean wound in the abdominal cavity it is the proper procedure, in my opinion, to close the wound absolutely. In those cases in which there is danger of accumulation of pus subsequent to the closure of the wound permanent drainage is justifiable until such time as, by the processes of nature, the cavity shall be closed.

Dr. Howard A. Kelly, of Baltimore, Md.—It gives me pleasure to express my views on a subject upon which I have

such a definite opinion as that of the question of drainage. Speaking broadly, I think we drain entirely too often. On the other hand, we do not drain half enough when we do drain. Of my first one hundred cases, eleven years ago, I drained over 80 per cent., while of my last series of one hundred cases I did not drain more than 1 or 2 per cent. I rarely drain prophylactically any more with the expectation that there will be some fluid poured out from the peritoneal cavity. I drain the abdomen in cases of localized sepsis, especially where I cannot clean the entire septic area out. If I am obliged to leave a bit of septic ovary in the pelvis, or part of a septic sinus, then I drain, as the constant reinfection of the peritoneum from the sinus must cause a septic peritonitis. Sometimes I drain after a difficult intestinal operation where there is some doubt as to whether or not the stitches will hold. I also drain when a large, raw, ragged pelvis is left and the patient is in bad condition. When I drain I put in an abundant drain and take good care that it is not choked at the opening through which it is brought. I prefer to bring it out through the vagina rather than through the abdominal wound, although in some cases it is wisest to utilize both avenues.

The question of drainage in appendicitis is important. In cases of general septic peritonitis from appendicitis I have a helpful instrument which I have devised for washing out the abdominal cavity in these cases. It is shaped like this: A curved metal tube, about fifteen inches long and a third of an inch in diameter, with a large metal ball on the end with holes in it. This is pushed through the opening into every part of the abdomen and used as an irrigator. The ball on the end is then used to push out the peritoneum in the flanks, where a drain is inserted. I use four drains—one in each flank, one over the appendix, and one into the vagina if it is a woman.

If I am satisfied that I cannot wash out the peritoneal cavity thoroughly I dry it as much as possible and close it up to the area around the appendix, or, if that organ has been removed in a clean way, close it up entirely.

Again, in regard to the general use of drainage in abdominal surgery, I use it very little. When I do use it I use it abundantly, taking care that it does not choke at the orifice of exit.

Dr. W. E. B. Davis, of Birmingham, Ala.—My views are not settled in regard to drainage. One's practice is largely the result of habit. Certainly too many cases are drained.

Coming to the subject of drainage in general septic peritonitis, it is impossible to lay down any well-defined plan of treatment supported by favorable results. The percentage of recoveries in these cases, even in the best hands, has been very small. I believe that the following plan of treatment is entitled to further consideration by the profession: After the abdomen is opened peroxide of hydrogen should be introduced in order to get rid of its septic contents. After its use the cavity should be flushed with normal salt solution. During the operation the salt solution should be given by infusion, and after the operation is completed a quart should be injected every three or four hours, according to the character of the pulse. Where this method of treatment is resorted to in connection with a very large gauze drain surrounded with rubber tissue the amount of discharge from the abdomen will be very large. The fluid introduced into the circulation serves as a means of continuous flushing of the abdominal cavity and at the same time it improves the circulation. The effect of this treatment is always marked.

With an experience of more than fifty deaths from suppurative peritonitis I have little confidence in the successful treatment of these cases, and advise this method with a great deal of hesitation. My experience and observation on lower animals confirms what I have seen clinically, and if these cases are to be saved we must have a different plan of treating them to that which we have pursued in the past.

Dr. Beverly MacMonagle, of San Francisco, Cal.—Judging from the title of the paper, it seems to cover the whole subject of abdominal surgery. The class of cases in which I have found it absolutely impossible to get along without using a certain amount of drainage has not been touched upon by any of the preceding speakers. I refer to those cases in which we operate on the gall-bladder and the gall-ducts. When the gall-bladder is opened it is very often absolutely essential to drain it; in short, in all the cases that were at all old in which I have operated on the gall-bladder I have found it in such a condition that it was usually necessary to drain. In doing this it was almost impossible to drain in such a way that a certain

amount of fluid would not escape into the cavity, and therefore it was necessary to have a small drain of gauze reaching into the peritoneal cavity. Under those circumstances and in those instances I do not think we have yet arrived at the point where we can dispense with abdominal drainage.

Another point in relation to the gall-bladder that has bothered me and which I have lately overcome is this—that down through the foramen of Winslow fluid will enter a sac of the peritoneal cavity that will hold considerable, and it cannot be drained by any drain that is brought out through the anterior wall of the abdomen. In some cases I find it is decidedly advantageous to drain through the loin in addition.

Dr. Long (closing the discussion).—I feel much gratified at the discussion which has taken place. My friend Dr. Simons did not quite understand the purport of the paper, because I distinctly advocated drainage in all acute suppurative cases, but I said in my paper that we should do this because we cannot do anything better.

I am very glad Dr. MacMonagle called our attention to the necessity of drainage in gall-bladder cases; and the reason that we must drain these cases, I take it, is because we cannot leave the field aseptically clean.

The question opened up by Dr. Davis as to the proper treatment of cases of acute suppurative general peritonitis is one which has not been answered satisfactorily. All we can say is that neither drainage nor anything else has succeeded in saving but a few of them. It is proper to drain in these cases because the septic matter rapidly kills the patient. What Dr. Kelly has said agrees with the tenor of the paper.

A FLAP OPERATION FOR ATRESIA OF THE VAGINA.

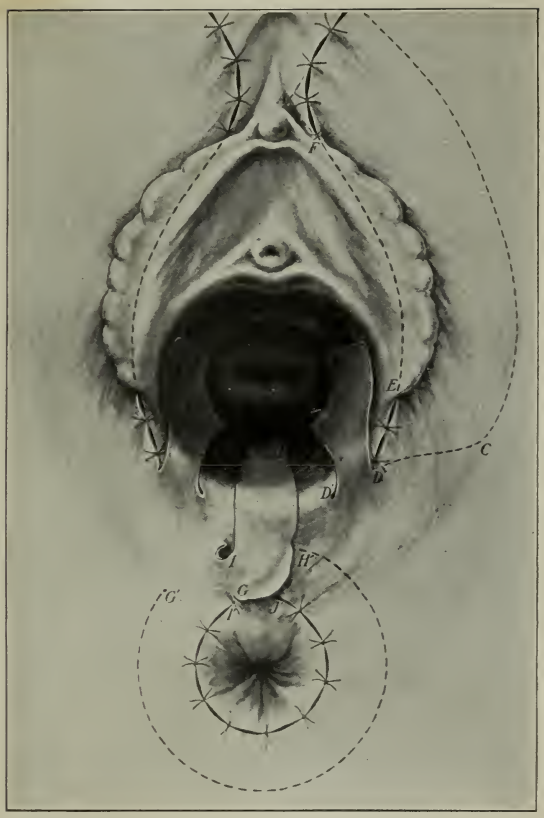
By George Henry Noble, M.D.,
Atlanta, Ga.

The unsatisfactory results in operations for atresia of the vagina, especially in complete occlusions of that canal, are known to you all, and doubtless disappointment from tediousness of treatment has been the rule in these cases; therefore I wish to present to you a little work that I have been doing in this line, with a view of describing my method of flap cutting.

I have tried taking flaps from the neighborhood of the perineum and inner aspect of the thigh, but it is difficult to secure skin free from hairy growth; beside these regions, especially the latter, are so far from the vaginal orifice that long pedicles are required, and as the limbs are subject to considerable motion the places from which the flaps are cut give a great deal of discomfort or create considerable soreness even when covered with skin grafts. Neither does the skin make as good a lining for the vagina as the mucous membrane, nor can I say that I am pleased with the results of skin-grafting in the vagina. The grafts are applied to rough surfaces, and do not take hold as readily as expected and are easily rubbed off in changing the dressings, which is a source of great disappointment to the operator.

The most satisfactory results I have obtained have been by cutting the flaps from the labia. In extensive or complete destruction of the vagina it is often difficult to secure enough mucous membrane to cover the entire denuded surface.

Fig. 1.



The principle, therefore, is to cover the posterior and two lateral walls of the vagina with two or more flaps, leaving a space or strip between them from one-half to three-quarters of an inch wide. The anterior wall will take care of itself or may be covered later by grafting from other parts of the body.

Where it is necessary to cover an extensive surface all the mucous membrane and part of the skin on the labia majora and sometimes the nymphæ must be utilized. The latter, however, should not be used on account of disfiguration, if it can be avoided. The flap should be outlined by beginning at the side of the clitoris at point marked *A* (Fig. 1) and extending obliquely upward and outward to the mucocutaneous margin *B*, and then following the line of junction of the skin and mucous membrane down the outer side of the vulva to a point on a level with the posterior commissure, *C*. The line should curve inward and below the vaginal orifice and stop about three-fourths of an inch from the margin of the opening. The line marking the inner edge of the flap starts at the beginning point *A* and runs downward in the groove or folds between the labia majora and nymphæ (dotted lines), at the lower extremity of the latter, *E*, turns into the vaginal orifice, and then downward toward the median line of the vaginæ, about the point marked with a small *x*. The line from *E* to *x* is not shown in the picture, as suturing of the skin and mucous membrane of the vaginæ has displaced the latter, and twisting of the pedicles at *D* covers its terminal point. The pedicle may be cut external to the vagina, and in that case the inner line would continue along the margin of the ostium vaginæ and terminate at *D′*. The flap on the opposite side is cut in the same way. An important point is to *make* the *flap thick*, and *especially* the *pedicles;* for if each of the latter are so formed as to contain an artery of fair size its life will be insured; provided, however, that no tension or twisting of the pedicle is permitted that will materially interfere with the blood-supply and cause strangulation. The flaps are

then turned into the vagina (see Fig. 2) and applied to the lateral walls; the angles marked *A′*, *B′*, *C′*, *D′* correspond to the same letters on the dotted lines (Fig. 1) marking the place from which the flaps are taken. The line of sutures, *B*, *F*, *D*, is the same shown by the same letters in Fig. 1. The pedicle appears much narrower than it really should be on account of the perspective showing the concavity formed by its fitting into the curve of the vaginal orifice. It is rarely necessary to stitch these flaps, as the dressing will hold them in close apposition to the vaginal walls; but if any difficulty is experienced in this the ends may be loosely fastened together with two catgut sutures, attaching *A′* and *B′* to the corresponding angles of the opposite flaps, allowing ample room between them to admit the cervix uteri.

In my first case I made the pedicles terminate close to the anus, hoping to get a good blood-supply from that region. The distance, however, from the anus to the posterior commissure, over which the pedicles necessarily turned, caused an unnecessary waste of material, for I lost in length just as much tissue as was required to reach from the anus to the ostium vaginæ. Since that I have been making the pedicles of the tissue near the margin of the vaginal orifice, endeavoring to secure the blood through the upper branch of the superficial perineal artery or from the region of the bulb of the vestibule.

Where the destruction of the vaginal mucous membrane is not so great, and yet where there has been too much to permit approximation of its edges after excision of the scar-tissue (see Fig. 3)—that is, after removing scar-tissue and breaking up adhesions between *I* and *II* and dissecting loose the mucosa, as shown by the dotted lines—the mucous membrane cannot be approximated *I* to *II* and *III* to *IV*; the flaps may then require turning around the axis of the vagina instead of being carried vertically downward in the direction of the long axis, as above described. In that case the pedicle should be made of the nymphæ, depending (see Fig. 4), therefore, upon the blood-supply they receive

Fig. 2.

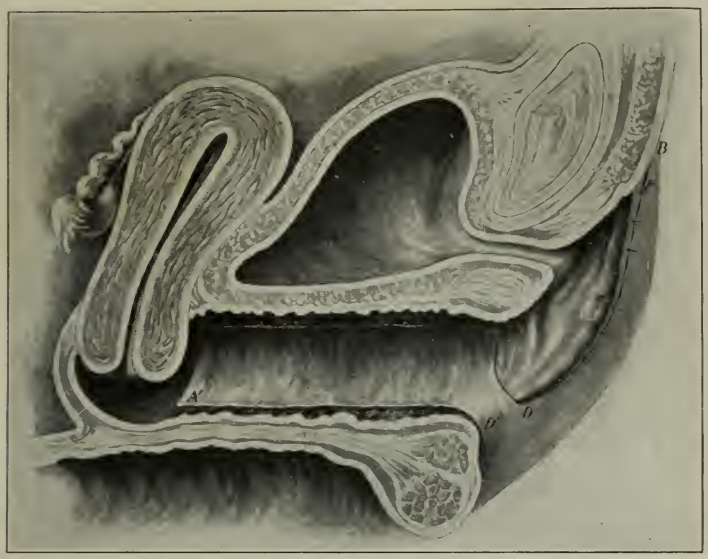


Fig. 3.

Fig. 4.

Fig. 5.

through their upper extremities. A great deal of tissue should be cut beneath them in order to include the deeper arterial branches. In this way the pedicles will be attached to the side of the flaps and their proximate ends turned upward on the margin of the vaginal orifice. In cutting the flaps the line above described should be followed except that they may be extended posteriorly to or near the median line. When the flaps are turned into the vagina their ends will be reversed: the upper one cut near the clitoris will be applied to the posterior wall, while the lower extremity will be applied to the anterior wall, and the middle portion will lie in contact with the lateral wall of the vagina. (See the change of figures in 1, 2, 3, and 4 in Fig. 4.) They will require stitching with catgut at the ends and middle to prevent slipping when the dressing is applied. In six or eight days the pedicles may be cut loose and restored to their normal positions, filling the niches and gaps made in or near the vaginal orifice. The nymphæ are, therefore, only temporarily employed as pedicles and are afterward restored to proper functions. The third or middle flap (Fig. 1) was cut from the mucous membrane of the prolapsed rectum and the smooth skin around the anus. The margins *G H* and *I J* correspond to the lines *G′ H′* and *I′ J′*. The line *G′ H′* has been displaced by the sliding of the skin in approximating the skin and mucosa.

The skin and mucous membrane over the entire labia majora may be removed without permanent disfiguration if the fatty tissue is left. It will fill out and reproduce the natural fulness and rounded shape in six months' time.

Fig. 5 represents a case that came to me from South Carolina. The rectovaginal septum was completely destroyed from the cervix downward. The white-dotted lines at *I*, *II*, and *III* show the original position of the destroyed perineum. The white, granular surface *I*, *III*, *IV*, and *V* is a mass of cicatricial tissue occupying the position of the destroyed vagina. The opening between *IV* and *V* is a communication between the remaining portion of the vagina

and rectum through which the menses enter the latter. In this case I resorted to a different procedure, taking mucous membrane from the rectum and utilizing it as a cover for the posterior wall of the vagina. It consisted of making an extensive flap-splitting operation after Tait's method; but instead of splitting the flaps at the rectovaginal junction, as is done in ordinary flap-splitting operations of the perineum, an incision was made from the extremity of the original laceration in the rectovaginal septum and carried down the sides of the rectum a distance from the lacerated margin equal to one-sixth of the circumference of the rectum. The line was then carried through the lower portion of the perineum just above the sphincter muscle. (See black-dotted lines *II, IV.*) This is better shown in Fig. 6. Let the line *I, II,* and *III* represent the vagina after breaking up adhesion and *I, IV,* and *III* represent the rectum. Instead of doing a flap-splitting operation at the rectovaginal junction, *I, III,* an incision was made on the side of the rectum one-sixth of its circumference from the rectovaginal junction or at *V,* cutting deep in the direction of the line *V, VI,* and then extended up and down, as shown by the cross lines at *VI.* The new rectal margin made by this incision (*II, IV,* in Fig. 5) was approximated by catgut sutures in the mucous membrane and a superimposed layer of the same material in the muscular tissue. In like manner the mucous membrane above the incision at *V* was closed with catgut, and in this way mucous membrane was turned into the vagina from the rectum. (See dark lines, Fig. 7.) In addition to the above two flaps were cut from the vulva and turned into the vagina, as described in Figs. 1 and 2. The results were exceedingly gratifying.

Now, I am going to show a simple thing, but an important one, in dressing these cases. In order to flatten out the granulations and secure good surface between the flaps it is necessary to make a certain amount of pressure with a smooth surface. I tried rubber tissue, but found it difficult to apply evenly; tried folding it over a cylindrical speculum, but this

Fig. 6.

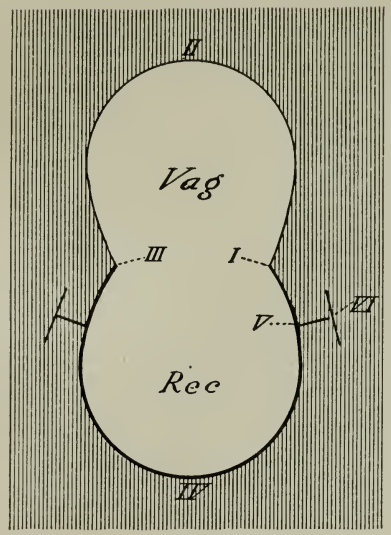
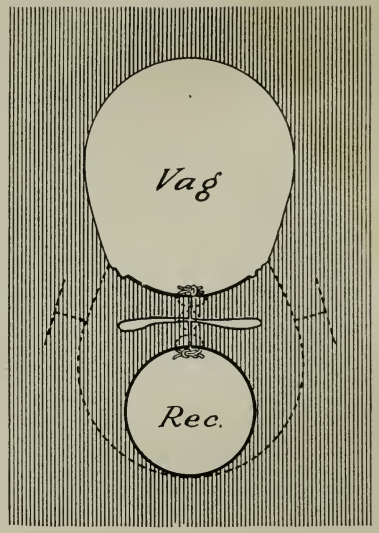


Fig. 7.



was unsatisfactory because ridges would form on either side where the tissue folded upon itself. The best thing is to slip a rubber bag (condom) over a Fergusson cylindrical speculum; then by means of strips of antiseptic gauze or sterile cotton it can be tamped and distended to any size or shape desired, spreading a smooth surface over the granulations and flattening them in a satisfactory manner, which will facilitate the growth of the epithelium.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—Mr. President: I am delighted with Dr. Noble's admirable demonstration. I have a case upon which I recently did an autoplastic operation for a vaginal atresia. The patient, a young woman, unfortunately had her urinary bladder badly torn by the efforts made by a woman physician who tried unsuccessfully to relieve the atresia; she left the country the next day and did not return. I took my flap by cutting down on each side of the bowel, and after having opened the septum between the urethra and the rectum I transplanted a perineal tongue into the vagina (illustrated by diagrams). I secured in this way a small, new vagina, 9 cm. in length. It had been taken for granted in this case by the previous operators that the uterus was infantile, which was not the case. She had an atresia of the vagina, acquired when she was about six years of age during a severe diphtheria. The uterus was well developed.

RECENT TECHNICAL IMPROVEMENTS IN THE SURGERY OF THE STOMACH FOR CARCINOMA.

By Willis G. Macdonald, M.D.,
Albany, N. Y.

The history of abdominal surgery is one of material and continued advancement. Its field of usefulness has presented progressively extending borders until each organ of every system has become amenable to surgical and life-saving intervention. In general, the diagnosis, indications for operation, surgical technique, and post-operative treatment are firmly established, surgical principles confirmed by abundant, painstaking pathological and clinical observation, collective operative experience, and the results attained in experimental surgery. The final determination of the established surgical methods in the treatment of uterine myoma, biliary calculi, appendicitis, and extra-uterine pregnancy is a triumph of surgery, the life-saving value of which is quite inestimable.

Although so much has been accomplished in the last three decades, there yet remain other fields for reinvestigation and the establishment of surgical principles which will more uniformly influence the treatment of the future. Carcinoma of the stomach is one of these fields for reinvestigation. Recently it is receiving its full share of careful consideration. At the last meeting of the American Surgical Association a number of contributions were presented dealing with the various phases of the subject. The results of this discussion have been most important in showing the necessity and possibility of early diagnosis, the desirability of early explora-

tion in obscure gastric disturbances, and, above all, the advantages of operative intervention uniformly undertaken.

The relative frequency of carcinoma of the stomach has been studied by a number of observers independently. Tanchow, after an investigation of the cause of death in 382,851 cases, came to the conclusion that $\frac{6}{10}$ per cent. was due to carcinoma of the stomach. Virchow, after an extensive investigation of the material available at the Pathological Institute in Berlin, found that nearly 2 per cent. of deaths arose from this cause. Welch, in investigating the cause of death in 11,175 cases that came to autopsy in the Pathological Institute at Prague, found that $3\frac{1}{2}$ per cent. of all the cases died from carcinoma of the stomach. Van Valzah, after a careful investigation of carcinoma of the stomach as an item in general mortality tables, came independently to the conclusion that more than 1 per cent. of all deaths were due to that disease. Considered from another stand-point, Welch found after a comparative study of 30,000 cases of malignancy that 21 per cent. of them were carcinoma of the stomach, and Virchow places the proportion still higher, at 35 per cent. No age is exempt from it. At least two cases of congenital carcinoma of the stomach have been reported, but the combined investigations of a very large number of independent observers, including the collective statistics of Gurlt, Linder, Hammerschlag, Welch, and Hemmeter, go to show that in the interval between the fortieth and sixtieth years nearly 60 per cent. of the cases of carcinoma occur.

Much attention has been recently attracted to the apparent increase of cancer in general. Statistics in this relation have been arranged by Park in this country, by the health authorities of the united kingdom of Great Britain and Ireland, and in Switzerland. All of these statistics agree that carcinoma is far more frequent at the present time than it was a few decades ago. Welch, in his study of the location of the growth in 1300 cases of carcinoma of the stomach, came to the conclusion that in more than 60 per cent. of the cases it

occupied the pyloric region, in 12 per cent. the lesser curvature, in 8 per cent. the cardia, and in 20 per cent. other portions of the stomach wall.

One of the most serious complications in carcinoma in general is early lymphatic invasion in the neighborhood of the tumor. Careful examination would seem to indicate that this occurs later in the course of carcinoma of the stomach than in carcinoma of the breast, uterus, tongue, and rectum. It is a matter of common observation that patients die from carcinoma, with pyloric stenosis, before any very extensive lymphatic invasion occurs. I had occasion recently to examine the specimen removed from a patient, at autopsy, who had persistently refused operation. In this case, although the most careful investigation was made, only a single group of lymphatic glands was found involved. Perry, after a study of thirty-eight autopsies in which the cause of death was carcinoma of the stomach, found that in 18 per cent. there were no secondary deposits in other regions. McArdle collected 1342 cases of cancer of the stomach, of which 802 were limited to the pylorus, and out of this number 496 were not associated with important lymphatic involvement. Gussenbauer, as the result of the examination of the autopsy registers in 542 cases of carcinoma of the pylorus, states that in 41 per cent. there was no metastasis of the disease in other organs, and that in 37 per cent. there were no adhesions.

These pathological conditions, based as they are upon a sufficiently large number of cases to present valued conclusions, seem to indicate beyond question that cancer of the stomach under proper conditions, with sufficiently early diagnosis and correct surgical technique, affords the opportunity for much life-saving.

Unfortunately, we find a considerable difference of opinion among surgeons, first of all with relation to surgical interference in any case. A large number of good surgeons are yet lukewarm in their advocacy of radical operation in carcinoma of the stomach or are active in their opposition to any

surgical intervention. A favorite form of argument against radical surgical intervention lies in the fact that no very considerable number of cases has remained free from recurrence for any length of time after operation, and that the operation itself is primarily associated with a very high mortality. I have taken occasion recently to make a cursory investigation of literature with relation to this subject, and have been able to find forty-three cases for which pylorectomy was done for carcinoma of the stomach, and that the patients were living without recurrence three years after the operation, and that there were patients in this group who were alive ten years after the primary operation without symptoms of recurrence. I may also say that this group of forty-three cases is collected from among 527 operations done for the relief of pyloric carcinoma, with an immediate mortality of 31 per cent. In other words, we have from the work already done rather more than 8 per cent. of final recoveries as judged by ordinary standards. This will compare very favorably with the ultimate success which we enjoyed a few years ago in the treatment of cancer of the breast. More recent statistics with relation to this matter, however, have shown wonderful improvement in the direction of final cure due to earlier surgical intervention and wider extirpation of the disease. A number of surgeons are now able to show groups of cases in which more than 50 per cent. have passed the three-year limit without any indications of recurrence. While carcinoma of the stomach presents, from a diagnostic stand-point, greater difficulties and technically the operation requires greater skill, yet it is but reasonable to assume that when the treatment of carcinoma of the stomach is placed upon the same basis as that of the more modern treatment of cancer of the breast equally advantageous results are to be expected. A very considerable number of pylorectomies were done, extending over a number of years, without any very material improvement in the technique of the operation, and until recently very few operations were undertaken until the tumor could be determined by abdominal palpation.

The technique employed by Billroth in his first pylorectomy was that employed by most surgeons for a number of years or, at least, with very slight modifications. This earlier operation presented many technical difficulties in its performance. The matter of the adjustment of the resected stomach and the duodenum at the completion of the operation was frequently defective. The operation of suture where two portions of the intestine and tube of different calibre is required is frequently a matter of considerable difficulty, nor can it be attained with absolute security. Secondary perforation at the line of suture, with subsequent peritonitis, has been a frequent cause of death associated with this earlier form of operation. In order to avoid some of these difficulties Kocher devised the method of closing entirely the resected stomach and implanting the duodenum in the posterior wall. This method of operation was a material improvement over the original Billroth method. Still another method, and the one to which I particularly wish to call your attention to-day, is the method by means of which both the duodenum and stomach are closed by suture, and subsequently a gastro-enterotomy is made by the method of von Hacker or Wolfler.

Before entering into a more accurate description of the preferable forms of surgical intervention in this serious disease it is profitable to consider something of the limitations of early and late exploratory abdominal section in the treatment of this condition. More recently a number of surgeons have expressed an opinion that the favorable time for operation in carcinoma of the stomach is past when palpation reveals a tumor in the epigastric region. The presence of tumor has until recently been held as a necessary requisite to operative intervention. I believe that careful consideration of the problems involved will demonstrate the extreme desirability of operative interference at an early date; that improved methods of diagnosis, including the physical exploration of the stomach and the chemical and bacteriological examination of its contents, will show in a very considerable number of

cases sufficient cause for early exploratory laparotomy. Any one or a combination of symptoms is a sufficient indication for operation. First, a chronic gastritis which is progressive in character under proper dietetic, medicinal, and physical treatment; second, a loss of gastric motility; third, progressive diminution of gastric peristalsis; fourth, a diminution of free hydrochloric acid, progressive in character; fifth, emaciation of the patient under forced diet (Gerhardt regards this as a very important symptom, and has frequently observed a loss of eight ounces or more per day in carcinoma of the stomach. Personally, I have observed a loss of five pounds per week for a number of weeks in succession); sixth, reduction of the hæmoglobin in the blood, progressive to 65 per cent. or under, and a moderate leucocytosis. It will be noted that the presence of hæmatemesis, lactic acid, the Oppler-Boas bacillus, and the epigastric tumor are omitted from this list of indications for operation. These symptoms, as a rule, appear too late to permit of radical surgical intervention.

In many cases many of these symptoms may be absent and yet an exploration can be readily justified. If carcinoma is not found some other condition, such as perigastritis, benign pyloric stenosis, or gastric dilatation, is likely to be quite as much benefited by surgical intervention as the other condition of cancer.

The operation for the radical extirpation of cancer of the stomach will necessarily have its modifications by surrounding anatomical conditions. In carcinoma of the pyloric region these conditions will always be found most favorable and the probability of a favorable ultimate prognosis the greatest. The symptoms of carcinoma of the lesser curvature or of the cardia are not so distinctive or so likely to attract the attention of the physician or the patient until much greater progress of the disease has occurred. The close proximity of the lesser curvature to the great bloodvessels and lymphatic channels will necessarily lead to wider and more inaccessible lymphatic infiltration than elsewhere.

Where the cardia is involved the lower portion of the œsophagus is much more liable to infiltration, together with the retro-œsophageal glands, than is the duodenum when the pylorus is invaded.

It will be seen after careful consideration that the widest extirpation is demanded in carcinoma of the stomach. With your permission I will call your attention to the careful investigations of Cuneo and Most in relation to the distributions of the lymphatics and lymph nodes as associated with carcinoma of the stomach. All surgery for carcinoma of necessity involves the removal, as far as is compatible with adjacent anatomical structures, of lymph nodes. These are very well illustrated in the drawing presented by Cuneo showing the group of lymphatic glands, one group lying along the lesser curvature in the gastrohepatic omentum, in immediate relation to the cœliac axis and the hepatic blood channels. Another group is found along the greater curvature, a third along the outer border of the cardia, while other groups are found respectively in the retropyloric and the retro-œsophageal spaces. In a complete pylorectomy it is extremely desirable to remove the lymphatics along both curvatures of the stomach as well as those lying behind the pylorus. This should be made a part of the routine of any radical operation. A second drawing shows the relative lines of invasion of the different layers of the stomach wall beside the limits of infiltration of the surrounding lymphatics. As a rule, the duodenum is not extensively involved in pyloric carcinoma, although a few observers have found infiltration of Brunner's glands in the upper portion of the duodenum.

There is little justification for the total extirpation of the stomach in a majority of cases, and the probability of cure will not be greater than surgical resection. The old rule of cutting one centimetre beyond all evidences of carcinomatous infiltration is not wide enough. Personally, I feel that the line of excision in the stomach should be at least three centimetres from the border of the last palpable infiltration, and

in the duodenum at least two centimetres from the most dependent portion of the growth.

Reference has been already made to the sources of failure in employing the older technique of Billroth for pylorectomy. The first, and chief, undoubtedly has been due to infection from the stomach contents at the time of operation; the second, from defects in the method of suture of the resected portions of the stomach and duodenum; the third, from the condition of biliary regurgitation into the stomach after operation.

A variety of clamps have been devised to overcome the first difficulty. I am familiar, however, with none so satisfactory as the more recently devised clamps of Kocher, which I present for your inspection. The accompanying drawing shows very well their mode of application. When accurately adjusted there is very little opportunity for leaking of the stomach contents, and they present material advantages in the control of hemorrhage from the wall of the stomach. By the application of these clamps to the stomach and duodenum with a little care all dangers of sepsis from the stomach and duodenum are avoided and the rapidity with which a pylorus may be resected is greatly increased.

Very little time is required to close the ends of the stomach and duodenum with a running catgut suture involving all the coats. This, again, is invaginated within the stomach and the calibre of the duodenum and the stump buried by rows of Lembert sutures. The manner of performing the subsequent gastro-enterotomy lies largely with the preferences of the surgeon doing the operation. My earlier gastro-enterotomies were done by the Wolfler method of attaching the jejunum and the anterior wall of the stomach. It appears to me that the two fatal cases in which I applied that method were due to regurgitation of bile into the stomach and persistent vomiting following operation. Some two years ago I commenced employing von Hacker's method of attaching the jejunum to the posterior gastric wall with a re-anastomosis between the duodenum and the jejunum. The results of

this method of operation have been most satisfactory. During the past year I have employed it eight times, with seven recoveries. For the most part the anastomosis between the jejunum and stomach has been made by the suture method, although a number of surgeons have been quite as successful in the employment of the Murphy button. For the secondary anastomosis I have uniformly used the Murphy button of moderate size by the device which is here illustrated by this simple drawing. The anastomosis by this method requires very little time for its performance and can be readily completed in five minutes. While the entire technique of this operative procedure appears quite complicated, yet under favorable circumstances I am sure the entire operation can be done within forty minutes, including the closure of the abdomen.

When an operation has been carried out by this method to its completion the following advantages may be claimed: First, freedom from contamination of the wound by stomach contents; second, accessibility of the neighboring lymphatic nodes for extirpation; third, no subsequent danger from suture perforation; fourth, freedom from loss of blood; and, fifth, the great saving of time required for the operation. The surgeon is not embarrassed in the least by the amount of tissue which he removes, as no effort is made to bring the duodenum and the remainder of the stomach in apposition.

Lateral anastomosis can be readily accomplished by a variety of methods, including the button. Practical experience has shown through the more recent statistics of Mikulicz, Maydl, Kocher, and others that an operation of this form presents far less immediate dangers to the patient than does the older method of Billroth.

But not all cases can be regarded as suitable ones for radical operation. Are we, then, to close our exploratory incision when we find extensive lymphatic invasion and infiltrated adhesions to the surrounding organs and to the parietal peritoneum? Experience has shown, again, that even in these cases life may be prolonged and the disagreeable symptoms

associated with the disease distinctly ameliorated by the operation of gastro-enterotomy. I have performed this operation already a number of times and afforded patients agreeable relief. In some of the advanced cases I have not hesitated to employ the Murphy button for the purposes of the operation, and under such circumstances it can be readily completed within a half-hour.

The immediate mortality for the operation of pylorectomy is an interesting study. Ewald condemned the operation because of its great mortality—73 per cent.—and until 1888 it was somewhere in the neighborhood of 60 per cent. Billroth's mortality was 45 per cent.; Mikulicz's, 30 per cent.; Kronlein's, 25 per cent.; Maydl's, 16 per cent.; Kocher's, 8.7 per cent. Mayo Robson in a study of 572 cases collected from various sources finds an average mortality of 30.4 per cent. Guinard found that in 148 cases of pylorectomy with end-to-end anastomosis the deaths were fifty-six, or 37.8 per cent., and in sixty-four cases of pylorectomy with subsequent lateral anastomosis there were ten deaths, or 15.6 per cent. This showing has been equally favorable in the experience of others.

DISCUSSION.

Dr. Hal C. Wyman, of Detroit, Mich.—Mr. President: This paper contains so many important technical points that it should not pass entirely unnoticed. It has been my misfortune—perhaps fortune—to have done some surgery upon the stomach, and I frankly confess that the doctor's improved method would certainly have resulted in making my work much easier. So far as my experience goes the principal difficulty encountered, in attempts to isolate the carcinomatous mass of the stomach from the different relations existing between the stomach and other organs, has been that frequently after obtaining the consent of the patient to make an exploratory operation I have reluctantly abandoned radical measures because I did not feel equal to the task of separating the adhesions so as to bring about complete isolation, such as the diagram clearly indicates may be done.

However, I hope Dr. Macdonald will explain to us just how he leaves in place the transverse colon in these cases and cuts through the mesentery and brings down the stomach, and how he controls the hemorrhage incident to that procedure. I have met a good deal of difficulty at that point, and have been compelled to apply clamps as well as the fingers of assistants in the effort to control hemorrhage. I would not for a moment say a word to deter any man from undertaking this line of work. It is important work, and one which promises just as much as the doctor has held out for it. Our patients have suffered a great deal owing to being compelled to wait until a tumor appears before anyone advises an operation. In my own practice I can point to sundry cases where I feared, and my friends have feared, I had perhaps made a premature operation, but none of those cases have resulted in death. The patients operated upon are undoubtedly well after having undergone gastro-enterostomies, and not a few of them may be expected to recover. There are certain diseases that affect the pylorus which give rise to symptoms such as are common in the earlier history of cancer, and when we operate on such cases we incur the risk of operating on benign obstructions of the pylorus. At the same time, these benign ulcers and contractions at that point terminate not infrequently fatally. I am sorry the statistics Dr. Macdonald has presented do not include any reference to benign contractions of the pylorus the result of cicatrization following ulceration. I have seen a number of cases where I could trace the ulcer for a considerable distance in the wall of the stomach immediately adjacent to the pylorus and involving a part of it—that is, the serpiginous type of ulcer which affects that part—and patients linger for a long time with symptoms of pyloric obstruction, vomiting after meals, dilatation of the stomach, and finally being worn out. These cases can be cured by pyloroplasty. They may be mistaken for cancer in their early history. If we have in some of these cases a history dating back one or two years we may be pretty sure it is not carcinoma, but a case of benign contraction of the pyloric orifice, and promises very well for treatment by a surgical operation.

Dr. F. W. McRae, of Atlanta, Ga.—I have been exceedingly interested in the very valuable paper of Dr. Macdonald, and it seems to me that he has done for malignant disease of

the pylorus in his operation what Roux's gastro-enterostomy long has done for benign stricture, and it is a much simpler operation than the latter. And why? Because the method of doing it is exceedingly ingenious and I believe is very much simpler than any other that is done, and the results which he has had abundantly justify the operation. One of the difficulties of the older operations was the regurgitation into the proximal portion of the duodenum; that is prevented by the second anastomosis here. The other point in Dr. Macdonald's paper which is equally important, if not more important, is that this operation should be done, or an exploratory operation should be done, even before a positive diagnosis can be made of the existence of a tumor in the abdomen. When a tumor can be felt in the abdomen it is practically too late to get good results in a large proportion of cases.

Dr. Macdonald (closing the discussion).—I will say briefly, in the cases Dr. Wyman speaks of, where adhesions exist in the peritoneum or liver and where there is great difficulty experienced in lifting up the pylorus, it is better not to undertake a radical operation, because the infiltration has already progressed beyond the possibility of doing the patient permanent good, and in such cases, in order to give relief, extend the duration of life, and drain the stomach, I do the second step operation, namely, the gastro-enterostomy. Experience has shown that on an average, in a considerable number of cases, this operation will extend the period of life more than a year. As to the hemorrhage, which is always a serious problem, I do not use very many clamps. Commencing just above the pylorus along the border of the liver, with an aneurism needle I doubly ligate along the lesser curvature first, then by passing my hands behind the stomach, and in that way acting as a guide, I continue the ligation of the single row of sutures with a dull aneurism needle, going back to the point opposite the kidney. This is the most tedious part of the operation, where one cannot afford to hurry. I have not been doing the operation very long. The necessary limitations of the paper, which has already been too long, forbid my giving a detailed history of many of these cases in which I have done two such pylorectomies, both patients having recovered, but it is too early to pass any opinion as to their longevity. There is no evidence of recurrence since that time. Prior to that time I

did pylorectomy by the old Billroth method, and succeeded in five patients, one out of twelve, one of whom is now living, it being three and a half years since the operation. More recently I have been doing the temporary operation in many cases of carcinoma of the stomach, which I feel now I should have undertaken because of the serious mortality of the old Billroth operation. Two years ago I simply did a gastro-enterostomy and allowed the cancer to remain, relieving the symptoms; but in favorable cases where the infiltrated parts can be lifted up and away from underlying structures I prefer to undertake this operation. If you can tell a patient that you have an operation which will give a wide extirpation of the disease, and which has only a certain percentage of immediate danger, under such circumstances you can urge operation with far greater force than you can in others. I appreciate the fact that it is quite impossible to fully discuss all of the features of this subject, and I also appreciate how incomplete my paper is. I tried to present the subject as briefly as possible, so as to bring the matter to your attention.

NORMAL MENSTRUATION.

THE FUNCTIONAL STATUS OF AMERICAN WOMEN. MENSTRUATION DURING PUBERTY AND ADOLESCENCE IN THE GIRL AT SCHOOL AND WORK.

By George J. Engelmann, M.D.,
Boston, Mass.

What is normal menstruation? or, more correctly, *What is the menstrual condition of the average girl in average health?* is a question which may well be asked and which has presented itself to me as one with regard to which our knowledge is exceedingly vague, and no solution is afforded by the investigations of either physiologist or gynecologist. The one presents the ideal and rarely existing condition; the other the pathological state, which, unfortunately, is altogether too frequent. The physiological function of no other viscus is studied in a diseased organ: everyone would at once recognize as misleading, if not absurd, the presentation of an analysis of the digestive action of the stomach of dyspeptics as typical of the gastric function, or the urine of diabetes, catarrh, or calculus as exemplifying the renal secretion, yet upon such a foundation is our knowledge of the uterine function based. In short, our knowledge of the menstrual function comes from the gynecologist, who sees only the abnormal. Familiar as we all are in a general way with the condition, we have no complete and positive knowledge. Authentic records and reliable data as to the status actually existing among supposedly healthy women are wanting, and yet this function is one deserving of the most careful investigation if we but consider its influence

upon woman's entire organism and the prolonged period of its activity. From three to five days each month does not seem much, but altogether, in time alone, these days of the menstrual flow become a phase of woman's life, making fully five years during the period of her highest activity and most perfect development—in this country throughout thirty-two years, from the time of puberty at fourteen to the menopause at forty-six.

The average duration is four and six-tenths days, and this recurring every twenty-eight days (which is within a small fraction of the actual average) indicates the prevalence of the period throughout one-sixth of her functional life—five and one-third years of the thirty-two. This includes only the time of the flow, generally designated as *menstruation.* The *menstrual period proper*—the rhythmically recurring wave, with its accompanying instability, mental and physical—is of longer duration; it covers the entire period of disturbed equilibrium, of intensification and depression, though usage has confined the term to the time of depression, of the hemorrhagic flow, regardless of the preceding period of intensification, and I shall here follow the general custom.

During this time physical endurance, judgment, mental acumen, and capacity are affected, the circulation is disturbed, and pulse, temperature, blood-pressure, pulmonary capacity, nerve tension, and muscle force fluctuate.

The profound changes in the circulation, in blood-pressure, physiologically demonstrated by the scientific experiments of de Ott and Wiessner, pathologically shown by increased congestion in morbidly affected parts, are, moreover, strikingly proven by zoölogical facts; in the baboon the naked or pale colored parts of the body, such as face, neck, and ischial region, assume a lively pink, in some cases a vivid red color (Bland Sutton): of the Macaci, Heape says: "The nipples and vulva become swollen and deeply congested and the skin of the buttocks swollen, tense, and of a brilliant red or even purple color. The abdominal wall also for a short space upward, the inside of the thighs,

sometimes as far down as the heel, and part of the tail are colored a vivid red, while the skin of the face, especially about the eyes, is flushed or blotched with red." In late pregnancy the coloring is still more vivid. Precisely as in the human we see that in pregnancy the same conditions appear, only to a higher degree; and is it not evident that a state associated with such striking physical changes and with such effects upon the circulatory system must influence the nervous system and the mind as well? Marked changes occur throughout the entire system and are noted with every recurrence of the flow; and the oncoming of the function, the advent of puberty, is like a tidal-wave, with a depression similar in character but more far-reaching, and preceded by an intensification of all vital powers which deeply influences woman's entire being.

Important as these ever-recurring changes are in their influence upon the life of woman, they are still to some extent enshrouded in the veil of mystery with which the female function has been surrounded in all ages and all civilizations; and it devolves upon us, in this progressive era of scientific research and humanitarian activity, to cast aside this mediæval relic, to study this function as we do all others, and to diffuse this knowledge, so essential for the welfare of woman and the future of the nation.

Hegar Reinl, Meyer, and de Ott have taught us much, and the classic study of Emmet has clearly traced certain phases of the period in later life; but the knowledge they give us is based upon the revelations of hospital and clinic or consulting-room: it is derived from the sick; of the healthy we know nothing.

Mary Putnam Jacobi stands alone, I believe, in her study of the function in approximately healthy women—in women actively engaged in the duties of life; and whilst we know what the morbid conditions are, what the ideal should be, investigation has not yet fully demonstrated the actually existing status in the average girl in good average health during puberty and adolescence. This I have attempted to

effect, and here present the facts as culled from the records of nearly 5000 cases from High and Normal School, from College and Department Store, of girls between fifteen and twenty-six years of age—the majority being between eighteen and twenty-two—in rather better than average health, and in numbers sufficient to admit of positive deductions as to what the conditions among the physically well actually are as to what we may term *average* or *normal menstruation* in the healthy girl before the strain of pregnancy or the traumatism of childbirth have left their impress upon that function which is so readily affected by all that endangers the health of women. While as to the details every case is a law unto itself, these numbers permit me to trace an average and also the laws which determine variations from such average, but it is the average of existing conditions only that I here present.

Recurrence. That rhythm which is so characteristic of all biological activity is clearly marked in the periodicity of sex which develops and increases in frequency with the perfection of the function in the gradual process of evolution. Beginning with the annual flowering of plants there is an upward march of the phenomena as we approach the higher mammalia, those allied to our own species, culminating in the menstrual period of woman (Ellis); the more highly evolved the animal the more sanguineous the catamenial flow (Wiltshire). In some monkeys such flow occurs, whilst at the same time the seasonal influence of the rut of the lower animals still persists (Heape, Ellis); in some it has been observed three times during the year—in December, January, and February; in others nine times in periods of six weeks; finally, in the macaque and baboon a decidedly sanguineous flow recurs monthly, lasting several days (Bland Sutton). This period is that of the *lunar* month, and in the guenon it is even recorded as recurring with each new moon (Holt); it is less in the chimpanzee—every twenty-third or twenty-fourth day (Keith).

In the human female the highest development of period-

icity is attained, and in recurrence each lunar month, but independent of the phases of the moon. Some investigations have been made with a view of determining the existence of some relation, but always with negative result. When once established, after that prepubertal period of highest vitality in girl life characterized by rapid growth, by lowest mortality but highest susceptibility and morbidity, the flow recurs, as the name indicates, in *menstrual* (monthly) periods, every twenty-eight days; but this is true of only some 31 per cent., the larger number, 45 per cent., being retarded and 24 per cent. recurring in less than twenty-eight days. There is a wide range between twenty-one and forty-two days, with extremes far beyond these limits, most frequently in a multiple of seven. Fully 50 per cent. are irregular—that is, do not recur with regularity to the day—a variation of over two days is very common, especially from twenty-six to twenty-eight and from twenty-eight to thirty days; frequently it is seven days, from twenty-one to twenty-eight, and but rarely over three weeks, from twenty-one to forty-two days.

This irregularity increases distinctly by at least 10 per cent. as duties become more stringent or application, mental or physical, more intense. Mental exertion shortens the interval, but physical strain, if not too great, rather tends to prolong it.

The average frequency in one freshman class was 36.75 days—a prolongation due to change of habits; but I have found no average of any larger number below 26.56, and this was in a senior class, with hard study.

Recurrence, like all other phases of this function, is influenced by circumstances and surroundings, by conditions mental and physical, more especially in the early years, when the system is most impressionable. Later the tissues are more resistant, the nervous and mental balance is more perfect, so that variations are less frequent and minor disturbances no longer affect the function. I find in a Normal School, in one group of students the average of 27.03 days

reduced to 26.56 by closer application and more serious work, while in another group, in better physical condition from more exercise and more hours of physical training, the change was decidedly less, and their average nearer to normal, 28.43 days.

Among women of the laboring classes of Europe who have borne children the average frequency is greater, the larger number being *under* twenty-eight days instead of *over*, as I find it to be among healthy young women before childbearing in this country.

Duration. The average duration, varying in different groups from 4.4 to 5.5 days, is 4.6 days—much the same as that found by Emmet, who notes 4.82 days as the average at puberty for those in the best health, who are regular from the first, with a change to 4.66 days for the same in after life. The variation is from 2 to 7 days, with very few beyond these extremes, the largest numbers at 4 and 5 days. Of 1000 freshmen, 30 per cent. showed 4 days; 31 per cent., 5 days; 9 per cent., 6 days. In the girl at work the duration is shorter: in 20 per cent., 3 days; in 23.8 per cent., 4 days; in 24.25 per cent., 5 days; in 10 per cent., 6 days; rarely do we find the highest average of a group of girls at study, as in one college group, 40 per cent. from 5 to 7 days.

It must be borne in mind that my observations are confined to healthy younger women in whom the function has not yet been disturbed by the trials of childbirth, hence probably the shorter duration than that recorded by other observers.

Duration, like frequency, is influenced by circumstances and surroundings, by conditions mental and physical; mostly, I believe, by those mental. Excitement and intense mental strain, usually hasten recurrence and lead to profuse and prolonged flow, though it may check; violent physical exertion will likewise prolong the period. With speedy cessation of the exciting cause the system, if healthy, soon returns to its normal cycle; but if the strain be continuous a perma-

nent impress is made upon the function. Thus in working women, especially those who have borne children, duration is greater, and in foreign countries where the women of the laboring classes are under the most trying conditions I find the duration among some groups seven and even eight days (Berlin, St. Petersburg); that it should be but 3.6 days among the peasant women of Norway seems incongruous unless it may be explained by the deterring influences of a northern climate. As already stated, I have sought here to present merely the conditions as they exist and not the causes which influence the numerous variations, so that I but note the fact.

SUFFERING varies with different groups between extremes of 32 per cent. and 95 per cent., more generally from 50 to 80 per cent., averaging 67 per cent.; in this I include moderate pain. From 11 per cent. to 18 per cent. suffer severely; as a rule, there is an increase of at least 10 per cent. with increase of mental strain in higher grade schools; but in a few modern, well-managed institutions, where proper attention is given to arrangement of study hours and to physical training, I note decrease of suffering.

The average for school and college is from 40 to 70 per cent.; for the girl in the department store, 83 per cent., differing with kind of work. It is least—78 per cent.—among floor-walkers and those who move about; among clerks and stenographers, sitting, 85 per cent.; saleswomen, those who stand, 91 per cent. By the seventeenth year the largest amount of suffering has developed, increasing, as a rule, with difficulty or strain of work.

Work, mental and physical, is *more trying and more wearisome during the period of depression*, as is admitted by at least 65 per cent. of students and working girls. It is more so as work is more severe, and also in younger years. In one college 83 per cent. of a senior class preparing for the first examination found work harder, and only 69 per cent. of the junior class admitted this. In a normal school 69 per cent. of those with but two periods of physical training

weekly so stated, while only 52 per cent. of those who gave more time to bodily development felt the same relaxation. Eighty per cent. is the average among working girls, varying from 78 per cent. to 91 per cent., according to the kind of work.

The most convincing proof of the impaired condition of the system—the existing lassitude and depression—is presented by the number of those who seek relief from daily routine of duty, or who are excused from work or study during the period of greatest relaxation, at the beginning of the flow; but many are unwilling and unable to yield to the demands of the system for rest and continue their work in this partially disabled condition. The strain is a severe one and evident in the character of the work done.

This is not an opinion or the result of individual observation, but recognized to such an extent in business houses with exacting duties and a demand for keen and continuous attention, that it is leading to the gradual reduction in the number of female employés; for instance, in the offices of the great railroad companies it is found that women are more inclined to remain away from their work (forced by natural causes) than men, and their emotional nature is less fitted for the trying duties of more responsible positions; misfortune or disturbances in domestic relations tell upon them more heavily than upon men and influence their capacity for work, from which they should be relieved at such times.

In educational institutions, where duties are less exacting and the claims of hygienic needs are regarded, it is becoming quite customary to excuse girls from attendance during the first days of the period. This is done for two reasons:

1. For the sake of prevention and protection against injury during this period of increased susceptibility.

This has, of recent years, been done to some extent by the advice of physicians here and there, but in some prominent private schools in our large cities the number habitually excused, as a precautionary measure, is surprisingly large; in one, 70 per cent.; in another, 24 per cent., with 46 per cent.

excused at times. This, of course, is in the smaller fashionable schools, where urgent necessity for close application does not exist, though some of the girls are preparing for college.

2. Necessity obliges others to rest by reason of their disability to perform the usual duties, and *30 per cent. are more or less frequently excused from work or study* on account of debility or suffering during the first day or two of the flow.

This is true of the higher institutions of learning, of normal school and college, as it is of the occupations; with variations determined by intensity and strain of duty, greater in higher classes than in lower, and in the more trying forms of work, as of saleswomen and those who stand.

Few are habitually excused, yet always some, and in exceptional cases as many as 17 and 20 per cent.; even nurses, who are supposed to enter upon training in perfect health, show 14 per cent. occasionally excused from recitation and 17 per cent. from the physical duties of their work.

The claims of necessity in the struggle for existence must yield to the lowered vitality of the period.

RÉSUMÉ. In brief, the menstrual period proper is characterized by an intensification of all vital energies, followed by a depression which appears with the coming of the flow, and this latter is the phase ordinarily termed "menstruation."

Under ideal conditions and in perfect health the physiological status is such that this epoch, preceded by a day or two of heightened activity, is marked by a moderate lassitude, mental and physical, the flow persisting for from four to five days and recurring at regular intervals of about twenty-eight days. It is a period of heightened susceptibility, and is so sensitive a barometer as to quickly record any variation from the normal; excitement, exertion, or fatigue, mental or physical, are promptly indicated by variation in this function, and in our every-day life such disturbing elements constantly occur, so that conditions actually existing vary greatly from this ideal.

The average period of the American girl in average health presents very different features: Regularity in 50 per cent.

only, recurrence every 28 days in 30 per cent., varying most frequently from 26 to 42 days, and being in 45 per cent. over 28; duration varies from 2 to 7 days, averaging 4.6 days; from 66 to 70 per cent. suffer more or less, the number of sufferers varying, according to age and intensity of occupation, between 30 and 90 per cent. Lessened ability for exertion, mental or physical, is admitted by 60 per cent.; some few are habitually incapacitated from work and 30 per cent. occasionally.

The functional condition of the girl, in good health, under modern conditions of life, is by no means the ideal one, and, in fact, the functional health of the American girl, the coming mother of American men, is far from what it should be by right of inheritance and surroundings. This fact we must recognize, we must face; upon physicians and educators devolves the duty of the study and correction of the evil.

DISCUSSION.

Dr. J. G. Earnest, of Atlanta, Ga.—Mr. President: I wish to thank the essayist for his able presentation of the subject of menstruation, because it is one which interests all of us. What is normal menstruation in one woman is not in another. In the matter of menstruation every woman is a law unto herself. Fifteen years of country practice has taught me that there is a vast difference in menstruation in the country girl—the girl whose nervous system has not been developed at the expense of the muscular system—and menstruation in the city woman. In the country, among that class of people, pain is hardly known as a factor in menstruation. It is an exceedingly rare thing to have country girls or women complain of pain during menstruation; indeed, the menstrual period comes unheralded to the woman except by the appearance of the flow itself. The class of patients that have been studied by the essayist consists almost entirely of women who reside in cities, whose nervous systems have been developed at the expense of their muscular systems. In that class of cases menstruation is entirely different from what it is in women who live a good portion of their lives

out of doors. I think we should take cognizance of that fact when we talk about the regulation and diet of women, also about the regulation of our schools and the restoration of women to a normal condition. Every woman is a law unto herself as to the time of menstruation as well as in regard to the amount of the flow that occurs at each menstrual period.

AN OPERATION DEVISED FOR THE TREATMENT OF MARKED PROLAPSE OF THE RECTUM IN WOMEN.

By J. Wesley Bovée, M.D.,
Washington, D. C.

The treatment of exaggerated rectal prolapse has taxed the most skilful surgeons of the world. Various methods in the way of plastic operations and the application of the cautery and many ingenious devices have been introduced, but generally these have been inadequate and unsatisfactory, even when repeated a number of times on the same patient. Generally resection of the rectum from below has been the best plastic procedure, but this has failed even when repeated. This procedure is much like shortening a drainage-tube by frequent amputations. In 1889 Jaennel (*Gazette heb. de Med. de Paris*, 1890, vol. xxvii., p. 246) proceeded by a different method—one original with himself, I believe, and which bids fair to meet with favor in the surgical world. Instead of pulling down and cutting off the end of a loose rectum, as had been done previously, he elevated and fixed the colon to an artificial anus wound in the iliac region. Bryant, of New York (*Annals of Surgery*, 1897, vol. xxvi., p. 165), found records of twenty-nine cases, including his own, done by this method. In some of them the technique was slightly modified. These cases were all primarily successful. Omitting three cases in which dates are not given, we have twenty-six reported from two weeks to two years after operation in which there was but one return (reported more than one year after operation) and one partial return.

It has been urgently recommended to make an artificial

anus at the same sitting that suspension of the physiological function of the rectum might be attained. This was due to the belief that the usual attending rectal disease was greatly improved by such rest. This idea is no doubt correct. Indeed, Bryant noticed a proportionate return of the prolapse as the unnatural anus became smaller. This relapse should not occur, though this tendency be considerable, if the bowel attachment be made to the fascia instead of to the peritoneum, as has been the rule in these operations. Again, if the area of the bowel adhesion be increased such return would be less likely to occur. A considerable number of these attachments have been made to the epiploica and a few to the mesentery—certainly not structures exerting much resistance. The difficulty of closing these artificial ani is great in even the small ones, requiring repeated operations, and in those sufficiently large to completely perform the function of the rectum it is still more difficult. This feature would seem, therefore, to be one to be avoided if possible. It produces a very troublesome condition, loathsome to the patient, and presages one or more operations. Then, too, the danger of ventral hernia at the site of the colotomy is great, often necessitating a severe subsequent operation.

In my case marked prolapse of the uterus was associated with hemorrhoids and great procidentia of the rectum in a woman to whom the uterine appendages were of little value. No simple operation would have relieved the rectal condition while the uterus was in such a state of prolapse and *vice versa.* These conditions thus associated caused me to resort to the unique radical procedure to be later described. While not applicable to all cases, as firm attachment of the uterus to the abdominal wall is necessary—a condition not consistent with safe childbearing—it has a limited field in rectal prolapse in women. It is not improbable that marked rectal prolapse, associated as it is with proctitis and tenesmus, is usually productive of some degree of uterine prolapse. This being true, this operation—so far as I am aware the first of the kind—will have a sphere, though necessarily limited, in

the treatment of these conditions. Removal of the appendages is not necessarily a feature of this operation, yet sterility should be certain or nearly so as an indication or justification. Though the patient is perfectly well, with no evidence of relapse, at the end of eight months, it is yet too early to record a perfect result. The prospect, however, is the brightest. The history of the case is as follows:

Sister V., a Sister of Charity in a neighboring city, was thirty-five years of age. She had been treated unsuccessfully a number of years for prolapse of the rectum and uterus and hemorrhoids. When she came into my care she was suffering from large internal and external hemorrhoids and a protruding roll of fully three inches of the rectum that was thickened and much discolored. The uterus was of about normal size, with its cervix just behind the pubes and the fundus very low posteriorly. A few days later, March 6, 1900, operation was done. The hemorrhoids were first removed, then the abdomen was opened by the usual sub-umbilical median-line incision. The left ovary was about three times its natural size and consisted largely of numerous cysts. The appendages were removed and the uterus firmly fixed to the abdominal wall by four interrupted, strong catgut sutures that passed through a considerable portion of the uterine fundus at the top and the principal fascia of the abdominal wall on either side of the incision. The rectum was now drawn upward until it was fairly tense and so held by an assistant until it was sutured to the cul-de-sac and posterior wall of the uterus up to the abdominal wall. This was done by a running catgut suture. It completely divided the retro-uterine pelvic cavity into two equilateral ones.

DISCUSSION.

Dr. George Ben Johnston, of Richmond, Va.—Mr. President: I have listened with a great deal of interest to Dr. Bovée's paper. The method he has described is extremely novel and very ingenious. I am not prepared to say that it is a good one until a greater length of time has elapsed than has already been

shown, because even yet there may be some further prolapse. As the uterus descends from its moorings and the ligament is firm there, it may give sufficient latitude to this organ, which is at present supporting the rectum, to allow some descent of the rectum. I think we ought to wait a sufficient length of time to establish beyond doubt that there will be no descent of the rectum before concluding that this method will prove altogether satisfactory. Some of these cases are so intractable, so persistent, that we are obliged to resort to very radical methods for relief, and it seems to me that this apparently radical method is not so dangerous as some others that can be resorted to. If this operation succeeds and complete relief is obtained at the end of a year, then I should think it ought to be used in other cases, especially the intractable cases, such as Dr. Bovée has reported to us.

Dr. Seneca D. Powell, of New York City, described a method, by means of blackboard illustrations, of treating prolapse of the rectum which was based upon the anatomical relations of the muscles and the causes of prolapse. This method was presented by him to the profession in New York in 1878.

Dr. Bovée (closing the discussion).—I desire to say that one point in this operation is to fasten the uterus to the abdominal wall so that there would be no dropping down. The uterus is firmly fixed by four sutures to the fascia of the abdominal wall, which holds it firmly. In other words, it is a fixation of the uterus to the abdominal wall, and not a suspension. The organ probably will not drop down. One point I made in the paper was that this operation is not applicable to women capable of bearing children, because the organ is fixed to the abdominal wall, which is a bad position for the uterus when it is pregnant.

The plan of treating the cases mentioned by Dr. Powell after the manner he describes is certainly very interesting and simple, but it would seem to me that we will get recurrences in them. It is a simple procedure and one devoid of any danger, and I am thankful to him for presenting it.

EXCISION OF THE EXTERNAL CAROTID ARTERY FOR INOPERABLE SARCOMA OF THE FACE, WITH REPORT OF CASES.

By William Perrin Nicolson, M.D.,
Atlanta, Ga.

In the experience of every surgeon nothing is perhaps more painful than the frequent cases that come to his notice of diseases that have reached an inoperable stage, when nothing is left but to send the sufferer away to await a steadily approaching doom. Perhaps no class of disease is less hopeful than sarcoma and kindred growths. It has been a subject of considerable study with me for a number of years to ascertain what amount of relief could be given in such cases by cutting off the supply of blood to the tumor and thus check its growth or decrease its size, as the case may be. In diseases of the face the arrangement of circulation has been such that the blood-supply from practically all of the external structures can be largely cut off through the external carotids without interfering with the circulation in the brain, and thus, perhaps, a more suitable field for the investigation of such lines cannot be offered. The cases reported below illustrate some of the features that I desire to bring out.

Case I. *Sarcoma of the Nose.*—W. A. M., male, aged thirty years. Referred to me by Dr. A. W. Calhoun and Dr. W. E. Campbell. Six months previous to the time I saw him he suffered apparently from a polypus of the nose, upon the right side, which was removed by the ordinary

operation and recurred in a few months. It was removed subsequently several times, each operation being followed by a rapid reappearance of the tumor. When I saw him about three weeks before operation the nose was completely obstructed, and the pain from the constant and increasing pressure was very great. Arrangements at this time were made for him to be operated upon within a few days, but in the meantime he fell into the hands of another physician, who made daily applications to the growth through the nostril, with the result of causing the most rapid increase in its size. When seen about three weeks subsequently his aspect had undergone a remarkable change. The growth was pressing back under the orbit, forcing the right eye against the supra-orbital ridge and out of the outer canthus. The side of the nose at this point was also bulging out decidedly. Upon the left side of the forehead there was a prominent tumor, which was of a resilient character. The suffering from the pressure was very severe and the growth in the nose was beginning to break down, as evidenced by the sanious discharge from the nostril. On October 3, 1900, the right external carotid artery was excised, all of its branches tied off, and its trunk in practically its entire extent. Soon after reacting from the operation the patient expressed himself as being almost immediately relieved of much of the feeling of pressure and requiring less morphine to control the pain. Two days after the operation the enlargement upon the forehead broke down and was opened, discharging a large amount of pus and revealing the fact that the bone was bare at this point. Either from the pus that unavoidably got into the left eye, or from infection from the discharge from the nose, a severe palpebral ophthalmia was set up in the left eye and subsequently in the right. The suffering and disfigurement from this and from the abscess obscured to a large extent any change that might have taken place as the result of the operation at this time but it was evident that all increase had been checked, with probably some diminution. Two weeks after the first opera-

tion the carotid upon the left side was also excised, with a decided improvement of the conditions, and two weeks subsequently he left for his home in the country. It was evident that the increase of the growth had been stopped, and the contour of the face had changed sufficiently to lead to the belief that there had been some positive decrease. Practically all pain had been relieved except that due to the abscess upon the forehead, but the future only can demonstrate how permanent these changes may be.

CASE II. *Inoperable Sarcoma of the Lower Jaw.*—W. C., mulatto, male, aged twenty-three years. Referred by Dr. Thompson, of Alabama. An enlargement of the left upper jaw began three months previous to the time I saw him, and the growth was so rapid that his physician, thinking it was an abscess, made an incision into the most prominent part, but found no pus or breaking-down of the tissues. He then made a diagnosis of rapidly growing sarcoma. At the time that I saw him the tumor involved the whole of the left upper jaw, pushing up the floor of the orbit until the eyeball was extruded from its socket, and extending well up upon the malar bone. The nose was pushed over to the right, beyond the median line, and the left nostril completely and the right partially obstructed. The roof of the mouth was forced down upon the left side and the enlargement extended well beyond the centre line of the roof of the mouth. The skin over the whole tumor was closely adherent. As several surgeons who had seen the case had pronounced it inoperable, he was advised to undergo the operation for excision of the external carotids as the only thing left to exercise any control over the growth. To this he readily assented and on October 10, 1900, the operation was done before the class of Atlanta College of Physicians and Surgeons, the left external being excised first on account of the growth being upon that side. The operation was difficult on account of quite a high division of the left common carotid, and was complicated by an unfortunate accident. The vessel was tied at two points, and when it was secured between the ligatures the proximal

end in some way slipped out of the ligature, causing a severe hemorrhage, which rendered it necessary to tie it quite near to the bifurcation. The progress of the case was perfectly satisfactory until the morning of the seventh day, when there occurred a profuse secondary hemorrhage from the cutting through of the ligature. Death must have inevitably resulted speedily but for the timely arrival of my assistant, Dr. Reid, who promptly reopened the wound, and, failing to secure the vessel with forceps, made direct pressure upon it with his finger until my arrival, when the common carotid was tied one inch below the bifurcation. Though practically exsanguinated, the patient reacted well under the employment of saline enemata. This accident rendered it necessary to postpone the second operation until the fourth week. The right external carotid was excised on November 8th and the condition of the patient is perfectly satisfactory at this time. Enough time has not elapsed to estimate the amount of good that will be accomplished in this case. As a result of the first operation the feeling of pressure in the growth was immediately relieved, and subsequently the nose upon that side of the tumor admitted the passage of air in respiration. The skin, which was formerly densely adherent to the tumor, is now movable, and the patient feels much more comfortable in every respect.

It is, of course, not claimed that by this method sarcoma can be permanently cured in many or in perhaps any cases; but in a disease of such direful prognosis the patient is entitled to any relief that can be offered, and any means that will prolong life, if desired by the sufferer, we should employ.

In hopeless cases it is worth much to the patient to be relieved of pain and to be impressed with the feeling that the dead march of affliction is checked. This certainly can be accomplished by the temporary ischæmia that results from arterial obliteration. In the face notably this can be done with little danger to life, and who would not risk his life even to bar the progress of impending suffocation or loss

of sight? That a stay of greater or less duration can be obtained is illustrated by the following case:

W. A. S., male, white, aged thirty-five years. Entered the Grady Hospital, under my care, in August, 1898, suffering from a rapidly growing tumor invading the nasal process of the superior maxillary and the nasal bone of the right side. The nature and surrounding of the tumor gave no hope of thorough removal, and he was advised to submit to double ligation of the external carotid. The operation was done about August 12, 1898, the right vessel being tied first. In attempting to ligate the left it was found impossible to find any bifurcation of the common carotid, so that I tied this vessel upon that side. He left for his home in Florida one week after the operation and continued in good health until May, 1900, when he again entered the hospital, with a growth at the same point, which was circumscribed and was removed by Dr. Cooper. The result was satisfactory. In this case the quiescence of the disease for the period of two years was, I am sure, due to the cutting off of the blood-supply.

As previously stated, subsequent operations have convinced me that even double ligations of the external carotids, simultaneously performed, cannot sufficiently control the blood-supply, on account of the very free anastomosis between the great trunks of the neck. For this reason the operation of excision of the artery was devised by Dr. Dawbarn, and to him is due the first demonstration of its usefulness. Fortunately, there is no mortality connected with operations upon the external carotid and there is no interference with the functions of the brain. In May, 1890, I first tied this vessel coincident with the removal of the upper jaw, and since that time I have tied the upper external carotid twenty-five times and the common twice. Nine single and one double ligation have been done in connection with the removal of the upper and lower jaw, and three single ligations in connection with removal of malignant growths, and four double operations, with a view to checking sarcomatous growths.

In all of these there has been no mortality, and in even the jaw operations there has been no case of shock. The excision of the external carotid artery is an operation of the first magnitude and deals with structures of vast and vital importance, but its accomplishment can be successfully carried out with very little loss of blood or general disturbance.

DISCUSSION.

Dr. Frederick W. Parham, of New Orleans, La.—Mr. President: I am very glad to hear the report of Dr. Nicolson. I have had a slight experience with the operation myself in one case in which I excised completely the external carotid artery on one side. This was a case of malignant tumor of the neck, where I put a double ligature around the common carotid, finding the vessel was involved, and then, cutting the carotid, lifted up the vessels until the bifurcation was reached, then putting two ligatures around the internal carotid, cutting between the two ligatures, then turning the whole mass, including the internal jugular vein, I gradually got the tumor out, carrying the dissection of the vessel up as high as the parotid gland, tying off all the branches as I went up. I did not do the operation as thoroughly as Dawbarn recommends—tearing it out from the parotid gland. I did not tie the vessel on the opposite side. In six weeks from that time, although this tumor was as thoroughly removed as possible, the actual cautery and chloride of zinc being used where I thought there were suspicious spots, notwithstanding this removal of vascular supply and as thorough an excision of the tumor as I could possibly make, in six weeks the man's condition was as bad as if I had not touched it. I believe life would have been prolonged if I had tied the external carotid on the other side.

Recently I had an interesting case showing the advantage of tying both external carotids simultaneously. This was a man suffering from what I considered an inoperable carcinoma of the tongue. The tongue showed an immense excavated ulcer, so that when he opened the mouth one could see a horrible-looking tongue lying with its dirty ulcer exposed to view. I concluded not to operate, but to try simultaneous ligation of

the external carotid arteries. I put a ligature around the left and then tied all the branches. I did this under cocaine anæsthesia (Schleich's solution). After giving him a rest I tied the external carotid just above the common carotid on the other side. In the course of one month the tongue, which had been œdematous and very ugly looking, became much reduced, and the excavated ulcer had reduced itself one-third its size and had now shrunken up so as to be represented by a fissure along the middle line of the tongue, and the condition had so much improved that I undertook excision of the tongue. I operated by the Kocher-Langenbeck method, making an incision below the jaw, and having cut through the jaw, I excised the tongue back to the epiglottis together with the tonsil and part of the soft palate. There was almost no hemorrhage except back in the tonsillar fossa, where there was a good deal of venous oozing, which I controlled by packing. I had no large vessel to tie. I was impressed by the advantage in this case of the preliminary ligation not only in controlling hemorrhage and making the steps of excision much easier, but especially in the effect it had had upon the progress of the carcinomatous disease.

Last Monday I began to operate for excision of a portion of the lower jaw, with infiltration at the floor of the mouth due to malignant disease. I concluded to cut down and secure the two external carotids first, and determine whether I should go on with the further operation. I cut down on the external carotid on the left side under chloroform, and found considerable difficulty in getting it owing to infiltration, which had pushed the artery back behind the internal jugular vein, so that the distance from the surface to the vessel on that side was fully twice the distance of the vessel on the other side. I put a ligature around the external carotid, finding that the infiltration extended up to and involved the sheath of the vessels. Finding that the external aspect of the larynx was involved and a portion of the pharynx would have to be excised, I put a ligature around the artery on the other side and let the patient alone. I cannot say what the effect has been.

We are indebted to Dr. Dawbarn for exploiting this operation in this country. I think he has done great service in calling our attention to the advantages of the ligature of that artery in surgery of this region. He mentioned in one of his articles

that years ago Bryant was among the first to practice the operation in this country. Dr. Sands at that time expressed surprise that he undertook such an operation for such a purpose, but the operation went on developing, especially in the hands of Dawbarn, who reported good results. Dr. Nicolson tells us that Dawbarn does not recommend simultaneous ligation of the external carotids, but allows an interval of ten days to elapse between the two ligations. It strikes me in some cases it would be better to do the two operations at the same time, in order to get a more pronounced effect on the blood-supply to the malignant region. This operation can be done under cocaine anæsthesia, and where the operation is to be performed simply as a ligation I believe it should be so done unless there are especial reasons for the contrary.

Dr. Nicolson (closing the discussion).—I have very little to say except a word or two in reference to the statement of Dr. Dawbarn. I had some correspondence with him some time ago about the simultaneous ligation of both external carotids, and Dr. Parham tells me that he meant ligating off all branches, which is practically the same as excision. Simultaneous ligation of the vessels can be done with absolute impunity. I have done it myself three times in the case of the external carotid, and once did a ligation of the external carotid on one side and of the common carotid upon the other. The other patient I spoke of was the only person, perhaps, who has ever had both external carotids and the common carotid tied.

As far as doing two excisions at one time is concerned, I am satisfied from my experience with these four operations that it can be done. The fear has been that the sudden cutting off of the circulation would be so great as to cause sloughing, but the anastomosis of the vessels is free.

I stated just now that when the proximal end, as in the first case, was tied and cut through the hemorrhage from the distal end was profuse for a few seconds, so that in the later operations I applied two ligatures and cut between. I cannot say what will be the result in these cases, as they have not been observed for a sufficiently long time.

As to doing these operations under cocaine anæsthesia, I am not familiar with doing operations of that magnitude under cocaine. The entire excision of the parotid gland is an enor-

mous operative procedure when we go deep into the neck. My experience has been that it is about as formidable an operation as I have ever done. It is an operation practically free from danger. Dawbarn has done it in twenty-six cases without a death, and in the cases I have had there is every indication to believe that there is no danger in the operation if the surgeon is accurate in his anatomy and is careful about his technique.

I shall report the results of these cases at some future meeting of the Association, and any cases that may come along subsequent to this time.

AUTO-INTOXICATION FROM RENAL INSUFFICIENCY, WITH AND WITHOUT DISEASED KIDNEYS; WITH REPORT OF SOME REMARKABLE CASES.

By James T. Jelks, M.D.,
Hot Springs, Ark.

My attention was especially called to this subject several years ago by reading Bouchard on *Auto-intoxication*, Haig on *Uric Acid*, and, later, papers from the lamented Etheridge, of Chicago, and L. Duncan Bulkley, of New York. Bulkley wrote of "Urinary Insufficiency in its Relation to Diseases of the Skin." Since then I have read what Purdy has to say on the subject, and for years have made a point of examination of the urinary output (for twenty-four hours) of every patient who consults me. I wish to assure you that it has been a revelation to me, and the therapeutics based on this revelation have enabled me to accomplish some marvellous results.

We have been accustomed to thinking of uræmia as a result of diseased kidneys. I now know it may occur in a person whose kidneys are perfectly sound. We have been taught recently by Bondurant and others that Bright's disease is a frequent factor in the causation of insanity. I know insanity may supervene in a patient who, as far as could be learned, had no family defect in this line, who had no organic disease of the kidneys, and was simply suffering from uræmic mania, or, if you please, insanity.

According to Purdy, Haig, Etheridge, Haines, and others the amount of urinary solids eliminated daily should bear a

certain proportion to the body weight. After forty years of age this amount is not so great, and hence a deduction is made from the standard. From forty to fifty years 10 per cent. is taken from the amount the person should pass, from fifty to sixty years 20 per cent., and from sixty to seventy years 30 per cent. A man say twenty to forty years of age and weighing 160 pounds should pass 1168 grains of urinary solids daily. If he passes by actual measurement only 500 grains, what has become of the 668 grains? Suppose this to continue for days, what will be the condition of the patient? One of several things may occur—either a general condition of uric-acidæmia, manifesting itself in vertigo, contracted capillaries, arterio-sclerosis, cold skin (especially the extremities), so-called sick headache (which is now recognized as uric-acid headache), the "blues" or melancholia, palpitation of the heart, interrupted heart-beat, various forms of skin diseases, endocarditis, pericarditis, myocarditis, rheumatism, gout, or, possibly, hysteria, epilepsy, and genuine insanity. Can it be possible that all these things may be the result of faulty elimination by the kidneys without the presence of disease in these organs? In the report of the following cases I have divided them into two groups—those with interstitial nephritis and those without any organic lesion of the kidneys. I would especially call your attention to the relation of auto-intoxication to disease in women. In recent years gynecologist is another name for surgeon, and rightly so; but I wish to say that many women who come to us do not need "local treatment" and do not need surgical interference, or if they seem to need the latter it is only apparently so. They are not cured by surgical procedures. Many would be cured if we took a broader view and give these patients a general overhauling and a general line of treatment calculated to put all their emunctories into good working order.

Our fathers were very nearly right when they purged all patients and gave so many of them calomel and squills. Here were remedies which stimulated elimination by the

bowels and kidneys, and the result was a general feeling of well-being. This position is well illustrated by the popularity of patent medicines. Practically all of them purge and stimulate the kidneys and eliminate waste products. Thus the vital processes are relieved of the accumulation of toxins which are naturally produced by tissue metabolism. Practically all diseases of adult life not infectious in character are results of faulty metabolism and faulty elimination, and if we can correct these defects our patients will be cured.

Before reporting the cases I will call your attention to the part that potassium salts play in the rôle of urinary intoxication, and from this you will readily see that no patient suffering from defective urinary elimination should have any salt of potassium under any circumstances. I would especially warn against the error of giving bromide of potassium for the nervousness of these patients and acetate or citrate of potassium as urinary stimulants.

Bouchard, on page 123 of his work on *Auto-intoxication*, says: "Where the emunction of urine falls to one-half or two-thirds of what it ought to be" "there is produced in the organism an accumulation of mineral substances, particularly potassium." Again, on the same page: "We know that among uræmic phenomena there may be, in certain conditions, a preponderance of the action of potassium, which may represent two-thirds of the toxicity instead of one-third. Quoting again from Bouchard, on page 125 we find: "If 1 kilogramme of man eliminates in twenty-four hours a quantity of urine capable of killing 461 grammes of animal, the proportional part that potassium plays is 217 grammes out of the 461—almost one-half." Hence we say under no circumstances give any salt of potassium to any patient whose kidneys are inflamed or inactive. In one of the cases referred to below I produced uræmia by giving bromide of potassium to quiet a distressing nervousness; again, to one patient I gave acetate of potassium together with an infusion of digitalis, to assist the latter in increasing the urinary output. The result

was an attack of uræmia, which subsided when the potassium salt was eliminated. In the treatment of these cases I have divided the remedies as follows: Those that stimulate the kidneys, as squills; those that do this by increasing the heart power, as digitalis or its derivatives; and those that are considered solvents for the urea, uric acid, urates, etc., as sodium salicylate, sodium phosphate, Vichy water. All of these remedies were used in connection with the baths, where it was possible to give them, and these patients were ordered to drink from one-half to one gallon of water from the hot springs daily. The diet consisted of vegetables, fruits, milk, and not more than three or four ounces of meat in twenty-four hours.

An easy method of ascertaining the amount of urinary solids is to collect the entire amount for twenty-four hours (let me ask you to insist on this with your patients, or they will bring you one-half or even one-third of the amount), take its specific gravity, multiply the number of ounces by the last two figures of the specific gravity, and to this amount add 10 per cent., and this will give you a very close approximation to the amount passed by the patient; or you may multiply the last two figures of the specific gravity by the coefficient of Häser, 2.33, and this will give you the number of grammes in 1000 c.c. of urine; then if the patient has passed 1500 c.c. you have a simple sum in arithmetic, as follows: Say the urine is 1020 specific gravity and he has passed 1500 c.c., you proceed as follows: 20 x 2.33 equals 46.60 grammes in 1000 c.c., therefore

$$\frac{46.60 \times 1500}{1000} = 69.9 \text{ grammes of solids.}$$

Personally I prefer the method advocated by Etheridge, Bulkley, and Haines, viz., multiply the number of ounces for the twenty-four hours by the last two figures of the specific gravity and add to the result 10 per cent.

Relation of Body Weight of Women of Average Health to Total Excretion of Urinary Solids.

Weight.	Total urinary solids.
90 pounds	500 grains daily.
95 "	535 " "
100 "	570 " "
105 "	605 " "
110 "	640 " "
115 "	675 " "
120 "	710 " "
125 "	745 " "
130 "	780 " "
135 "	815 " "
140 "	850 " "
145 "	885 " "
150 "	920 " "
155 "	955 " "
160 "	990 " "
165 "	1025 " "
170 "	1060 " "
180 "	1100 " "

Patients between 40 and 50 years of age, deduct 10 per cent.
" " 50 and 60 " " " 20 "
" " 60 and 70 " " " 30 "

Relation of Body Weight of Healthy Human Beings to Daily Excretion of Urinary Solids.

Weight.	Total urinary solids.	Women of average health. Weight.	Women of average health. Total urinary solids.
40	392 grains.	90	500 grains daily.
50	479 "	95	535 " "
60	563 "	100	570 " "
70	639 "	105	605 " "
80	716 "	110	640 " "
90	789 "	115	675 " "
100	854 "	120	710 " "
110	916 "	125	745 " "
120	974 "	130	780 " "
130	1028 "	135	815 " "
140	1078 "	140	850 " "
150	1150 "	145	885 " "
160	1198 "	150	920 " "
170	1237 "	155	955 " "
180	1260 "	160	990 " "
190	1300 "	165	1025 " "
200	1330 "	170	1060 " "
		180	1100 " "

Patients	between	40 and 50	years of	age,	deduct	10	per cent.
"	"	50 and 60	"	"	"	20	"
"	"	60 and 70	"	"	"	30	"

Case I.—W. J. B., aged forty years; weight, 170 pounds; came to Hot Springs for disease of the rectum, which was pronounced syphilitic, and his physician gave him hydrarg. and iodide of potassium, the latter in increasing doses until 240 grains a day were given. The last ten days of the treatment the patient grew rapidly worse, became delirious and weak, was put to bed, and a watch set over him. Delirium increased until his family decided to send him to some institution for nervous diseases. At this point I was called in consultation with two other physicians. The physician in attendance thought the patient suffering from syphilis of the brain. This I questioned for several reasons, and one was that the bad symptoms came on after the large doses of iodide of potassium were reached; and knowing that potassium salts enter largely into the etiology of uræmia I thought that the man was suffering from urinary intoxication. His urine for twenty-four hours showed 20 ounces, specific gravity 1010, albumin, and hyaline casts. This gave 240 grains of urinary solids as against 1237 that he should pass. The hydrarg. and iodide were discontinued, and at the request of his physician, who was on the point of leaving for his vacation, I took charge of the case. He was given one quart of Vichy water daily, one glass of milk every two hours, and a tablespoonful of infusion of digitalis after meals. His brain cleared up, in ten days his mind was clear, and in two weeks every vestige of his insanity was gone.

Case II.—Mrs. B. Hope, Ark., aged fifty years; weight 90 pounds. Great depression; always has the "blues" and believes that she is dying; constantly says so to her family and friends and accuses them of want of affection, though they are devoted to her. Analysis showed albumin and casts. She should pass 500 grains daily; passed 170; stored 330.

Case III.—Mrs. M., Kentucky, aged sixty-five years; weight 170 pounds. Rheumatic pains. Examination showed

albumin and casts. She should pass 1060 grains daily; passed 264; stored 796.

Case IV.—Mrs. J. Heart very irregular, rapid, and intermittent; delirium and constant talking, singing, or counting, with incessant motion of the hands or feet; an utter impossibility to keep her quiet, though there was no violence. Urine for months showed no albumin and no casts. After a prolonged course of diuretin, which is a salicylate of theobromine, casts and albumin both appeared in the urine, the latter in about 50 per cent. by volume. She has had, in the last twelve months, four attacks of dropsy. I placed her on infusion of digitalis and Vichy water, with nitroglycerin, and the urine increased to 100 ounces daily. At this point all symptoms of uræmia disappeared and her heart lost much of its irregularity.

Case V.—Dr. J. P., aged sixty-four years; weight, 190 pounds. Rheumatism in knees, vertigo, and great weakness. Urine showed no albumin and no casts. Should pass 910 grains of solids daily; passed 364; stored 546. Treatment as above outlined for one month, in connection with the baths, relieved him of all his symptoms.

Case VI. — Mrs. G., aged thirty-three years; weight, 125 pounds. Intense nervousness, becomes very melancholic, and cries easily. No albumin and no casts. Should pass 745 grains; passed 389; stored 356.

Case VII.—J. A., aged thirty-five years; weight, 150 pounds. Rheumatism in the hands and feet. No albumin or casts in the urine. Should pass 1150 grains of solids daily; passed 396; stored 754. In two weeks, under digitalin, he passed 704 and was steadily improving.

Case VIII.—Col. B., aged sixty-one years; weight, 135 pounds. Rheumatism in the feet, back, and knees. No albumin, no casts. He should pass 821 grains of urinary solids daily; passed 572; stored 249 grains.

Case IX. — Mr. J., aged forty years; weight, 220 pounds. He came to me suffering from an attack of carbuncles, with high fever. After he was operated on the fever disappeared

and the wound healed; later on he became delirious and we were compelled to tie him to his bed. He was as "mad as a March hare." Urine was very scant in quantity and of high specific gravity. At one time we seriously considered sending him to an insane asylum. Under digitalin, Vichy water, hot water, and milk the urine increased in quantity, and when it reached 100 ounces his brain cleared up.

Case X. — Mrs. L., aged thirty-eight years; weight, 130 pounds. Very nervous and depressed. For the last seventeen years had facial neuralgia about every twenty days. Urinalysis showed no albumin and no casts. Should pass 780 grains; passed 229; stored 561.

Case XI. — Mr. J. W., aged forty-nine years; weight, 160 pounds; lawyer; very nervous. Had vertigo and was unable to work with vigor. No albumin, no casts. Should pass 1097 grains; passed 792; stored 305.

Case XII. — Mr. D., aged thirty-eight years; weight, 240 pounds. Rheumatic pains over the body. No albumin, no casts. Should pass 1330 grains or more; passed 720; stored 610.

Case XIII.—Dr. R., aged forty-two years; weight, 170 pounds. Rheumatism. No albumin, no casts. Should pass 1150 grains; passed 728; stored 422.

Case XIV.—Mr. L., aged thirty-eight years; weight, 170 pounds. Vertigo, melancholia, and very irritable. Hands and feet burn all the time; pain in calves of leg and lumbar region. No albumin, no casts. Should pass 1237 grains; passed 363; stored 874.

Case XV.—W. E. O., aged thirty-five years; weight, 175 pounds. Urinalysis showed no albumin and no casts. He suffered great depression, weakness, interrupted heart-beat, and intense melancholia. Passed 12 ounces of urine with a specific gravity of 1030. Should pass 1250 grains; passed 396; stored 854.

Case XVI.—Dr. T., aged forty-eight years; weight, 160 pounds. Vertigo, melancholia, difficulty in keeping up conversation; secludes himself and sees no one if he can help

it; apprehends epilepsy. Urinalysis showed no albumin, no casts. Should pass 1040 grains; passed 374; stored 666.

CASE XVII.—Mrs. M., aged forty years; weight, 150 pounds. Vertigo, low spirits. Urinalysis showed no albumin, no casts. Should pass 850 grains; passed 572; stored 278.

CASE XVIII.—Mr. E. N., aged thirty-nine years; weight, 165 pounds. Great vertigo, could not attend to business, and could scarcely get about; frequently fell down. Urinalysis showed no albumin, no casts. Should pass 1120 grains; passed 432; stored 688.

CASE XIX.—Mr. J. S., aged thirty-seven years; weight, 170 pounds. Rheumatism in hands and knees. No albumin, no casts. Should pass 1237 grains; passed 531; stored 706.

CASE XX.—Mr. S., aged forty years; weight, 250 pounds. Consulted me September 15th. For the last week great vertigo, weakness, and heaviness of the legs; could not stand. Urinalysis showed 19½ ounces, with specific gravity of 1025. Should pass 1400 grains; he was passing 487 and storing 913.

CASE XXI.—Col. J., a prominent politician, suffered from an uncontrollable desire to talk. He had a perfect diarrhœa of words and he impressed people unfavorably, who thought he was going crazy, and so reported him. When he consulted me this was the only noticeable feature about the case. Urinalysis showed there was no albumin, but he was eliminating 1750 grains of urinary solids when he should have passed 1260. Here was a plus elimination of 490 grains a day. This was strange, and it occurred to me that the plus elimination of these poisons set his tongue wagging continuously; in other words, he had previously stored up large quantities of these toxins and was suffering from a too rapid elimination. He was relieved by giving him for one week nitrohydrochloric acid and then sodium salicylate in addition to the acid. Recovery was complete and permanent.

DISCUSSION.

Dr. M. Campbell, of Knoxville, Tenn.—Mr. President: I desire to say a few words in connection with the paper that has been presented by Dr. Jelks. I have charge of a hospital for the insane. A large class of patients are insane, according to what the essayist has said, from faulty elimination. I have diagnosticated such cases by sight and have not waited to collect the urine for twenty-four hours, as Dr. Jelks has done, but have put some of these patients upon calomel and squills, digitalis and hydrastis, at once, and have frequently had brilliant results. The minds of these patients so treated have cleared up at the end of two or three weeks.

We have a large number of cases whose insanity does not depend wholly upon toxins. It is true these toxins accumulate and may cause some mental disturbance, but the patients are benefited materially by treatment directed toward thorough elimination.

Dr. M. C. McGannon, of Nashville, Tenn.—I do not desire to make any extended remarks upon the very interesting paper presented by Dr. Jelks, but wish to indorse what he has said in connection with the elimination of urinary solids. I think it has been the experience of many of us who are engaged in the practice of medicine, and particularly those of us who are giving special attention to diseases of women, to notice that our patients are benefited by treatment directed along the lines Dr. Jelks has suggested.

I object to the statement made by the essayist in the beginning of his paper that the diseases of women are purely and wholly surgical. There are many diseases peculiar to women that are not purely surgical.

There is another objection I would raise. I believe the doctor stated that if we paid more attention to the question of urinary analysis we would be treating fewer of our female patients with local applications. I wish to say that sometimes practitioners treat patients with local applications when they ought not to do so, and this is an error on the part of those who do such work. I do not believe men well qualified to be specialists are guilty of such errors. Personally I disclaim such

work, and I protest against its being placed at the door of the specialists.

Dr. Jelks (closing the discussion).—I stated in the beginning of my paper that a gynecologist was practically another name for surgeon. The doctor misunderstood me slightly. I did not mean to convey the idea that all patients who come to us require surgical treatment. I simply meant to say that practically we get away from our moorings, and when a woman comes to us for treatment, if we are gynecologists solely and exclusively, we see nothing the matter with such women except that there is something wrong with their uteri. If there is a slight tear of the cervix we operate on it; the chances are that the woman may not be suffering because of the slight tear of the cervix, but from the faulty elimination and accumulation of toxins in the system. There are many cases that come to us for treatment and we find very little wrong with the uterus. We should take a broader view of these matters, and instead of confining ourselves to one little organ we should examine the whole woman in every particular and not proceed to operate upon a perineum or cervix because it is slightly torn.

PSEUDOMEMBRANOUS ENTERITIS AND ITS RELATION TO ABDOMINAL SURGERY.

By Frank A. Glasgow, M.D.,
St. Louis, Mo.

My object in presenting this paper is not to present a thesis on pseudomembranous enteritis, for this would not be the proper place to present such a paper.

It also is not to discuss appendicitis *per se*, for I leave this to men of more experience with this disease than I have had.

My principal object is to call the attention of the profession to this very common disease, termed mucous colitis or pseudomembranous enteritis, and to urge upon them to study the relation of this disease to appendicitis.

Some years ago, about 1892, when my attention was first called to this disease, I looked up what literature was at my command and found that nothing was known of the etiology of this disease. The symptoms were given as severe colic-like pains, varying in intensity from day to day, with sometimes long periods of comparative freedom from pain. While these colic-like pains were present the patient was generally costive, and when the bowels did move from enema or purgatives there were mucous or jelly-like masses or even pseudomembranes discharged. Sometimes these were good casts of the lumen of the bowel, at other times shreds or long pieces resembling lumbricoids.

During the attacks of pain the abdomen was generally very sensitive and the peristaltic movement of the intestines caused much suffering. The rectum was also very sensitive.

The disease was chronic, with acute exacerbations. One work I recall stated that the pathology was not known, for the patients generally lived for ten or fifteen years and then died of some other disease, so no autopsies could be obtained.

I could find no plan of treatment outlined except a general tonic one, such as for a scrofula or a tubercular disease.

The first case I had, or, rather, recognized, was in a very nervous individual, a typical neurasthenic. Her family was of the same type. One sister was in the insane asylum and another was a morphine habitué.

During the attacks, which were almost continuous, her abdomen would be really more sensitive than in a case of peritonitis. The rectum was extremely sensitive. She could bring me a four-ounce bottle full of membranes almost any time.

I had one patient who was so extremely sensitive in the vagina and pelvis, also over the abdomen, that no examination worthy of the name could be made without an anæsthetic. She had suffered for years, and as she had fever both the attending surgeon and myself suspected tubal trouble. We gave her chloroform. The examination showed that there was no palpable lesion outside of the uterus. I dilated the cervical canal and gently curetted the endometrium, although I confess it did not seem to need it. There was a hemorrhoidal condition of the anus, for which the sphincter was dilated. We were no wiser after the examination than before, for we found nothing which could explain the symptoms.

A day or so later I made the discovery that she was passing firm, jelly-like masses. This now explained the symptoms as far as a name for symptoms explains anything.

From the observation of the above cases and numerous others (about twenty-five recorded cases) I have come to the conclusion that the disease is one of nervous origin and not primarily intestinal. This opinion is also held by the authors of the few recent articles on this disease which I have seen.

The peculiar symptoms displayed in this disease made me suspect that it was sometimes mistaken for peritonitis or appendicitis by those who were not acquainted with the symptoms of pseudomembranous enteritis.

Some of the cases would have fever even up to 103°, but many would not have any elevation of temperature and the pulse would not be abnormally high.

I can very well understand how a case in which the pain is located more in the neighborhood of the appendix could be mistaken for one of appendicitis. I do not really know how appendicitis could be excluded. In such a case I think it best not to hesitate, but to operate without delay, for I believe this disease is in many cases a cause of appendicitis.

How many of the enormous number of cases of appendicitis which are operated upon show a gross lesion?

I have heard physicians say they have seen perfectly normal appendices removed. I do not doubt that the symptoms, according to our present knowledge, warranted the operation. If the appendix is at all enlarged or congested it is removed.

I believe there are many cases which might be properly termed appendicial colic due to temporary closure of the opening into the gut. This could well explain the many cases of complete recovery which undoubtedly occur. It does not seem possible to me for a diseased, closed appendix to be anything but an active, offending body in the abdomen. It is now advised by some to remove the appendix whenever a laparotomy is performed, even if it is not diseased, for fear it may cause future trouble.

Do not many of the cases cured by operation have colic-like pains for a long time—months, perhaps years—after the operation? These we ascribe to adhesions which we trust will be absorbed in time. Is it not possible that some of these cases were not cases of appendicitis?

The appendix has a bad name, and if we do take out one which has never caused trouble no one will blame us.

I do not myself wish to champion it. I merely wish to

call attention to another cause of trouble in the abdomen which should not, in the present state of our knowledge, come under the surgeon's knife. I was on the watch for some case which had been operated upon and I found one. She informed me that she had had her abdomen opened in Kansas City, but that the surgeon did not find anything wrong inside. I admired the honesty of the surgeon and felt sure if that sort of a man had had his attention called to these cases he would not have opened that abdomen.

I had another case from St. Joseph, Mo. I saw her in the spring of 1899. She told me that she had been laid up in bed for six weeks in October and November of the preceding year with peritonitis. I supposed, of course, that there was tubal trouble and that leakage had taken place. She had had pains off and on ever since.

On making an examination I was very much surprised to find no trace of pelvic trouble. Then I inquired more particularly about the peritonitis. She said that she had very little fever and much of the time none. This seemed a queer kind of peritonitis—no fever and no trace left. She stated, further, that she had jelly-like and flake-like discharges from the bowels, accompanied by cramps. I ventured to tell her that I did not believe she had had peritonitis, but that she did have pseudomembranous enteritis. She was very much surprised, as she had had two of the most prominent physicians in her city in attendance upon her.

Two days later I was called to see her in an attack of "peritonitis." She lay on her back, with her knees drawn up. Her abdomen was somewhat distended and so sensitive that she could not bear the least pressure on it. Her *pulse* and *temperature* were *normal.* She was passing thick, mucoid discharges from the bowels. This patient was out on the streets within four days. She was convinced that I was right.

I saw one case with three of the most eminent surgeons in St. Louis when we all thought that it was a case of peritonitis, probably originating from the appendix, as it could not

be localized. The temperature was 103°. I agreed with the rest and thought an operation the proper thing, but that it did not offer much hope. The boy was a nephew of one of the surgeons. He was not operated on, but recovered, as he had done from many other attacks.

This young man, about seventeen years of age, had never been able to keep a position more than six weeks on account of a recurrence of these attacks. There was in this case no mucous discharge from the bowels.

After thinking over this case for a few days it occurred to me that perhaps it was possible to have such attacks, as in mucous colitis, without the bowel discharge. I suggested this to the doctor in charge and also suggested a line of treatment, which I will speak of later. He was put upon this treatment and has never had an attack since that day, which was about five years ago.

I have been practising more than twenty years, all of the time connected with one or more large hospitals and in charge of a large gynecological clinic most of the time. Even under these circumstances I have had very few cases of appendicitis requiring operation, and none which were operated on subsequently, to my knowledge, by others. I used to think this strange and ascribed it to the fact that my practice has been almost exclusively among women and children.

It is only comparatively recently that I have connected the fact of my having so many cases of pseudomembranous enteritis with the paucity of appendicitis cases. It has occurred to me that perhaps these were the mild, non-suppurative cases. These were the cases reported by bystanders as normal appendices removed. I have had two cases in the past year which have confirmed me in this opinion. One was the case of a young married lady who had been subject to attacks for several years. She had also mucous colitis, but some of the attacks in which I saw her were apparently appendicitis. The location of pain and sensitiveness was exactly over the appendix. None of the attacks in which I saw her were very severe, but were accompanied by some

fever. I advised operation long before she consented. She was seen in attacks by various medical men in the East, all of whom said that she must be operated on without delay. She would not allow it, for she was determined that I should perform the operation. In the fall of 1899 she came home and had another attack. After she recovered from this I operated. I had never been able to make out any tumor. I was surprised at the condition in which I found the appendix.

After attacks extending through years, and many of them severe, I certainly was justified in expecting to find a very hard, thickened, enlarged appendix, bound down by adhesions in every direction and of old standing. Such was not the case. The appendix was congested and of double the ordinary size and quite firm. It did not look like an appendix diseased for years. It lay behind the caput coli and was bound down by few and soft adhesions.

A short time before operating on this case I had operated on another case of pseudomembranous enteritis for an acute attack of appendicitis. This case I had been treating for some time for mucous colitis, but there had been no symptoms of appendicial trouble.

She was seen by an eminent surgeon of my city, who coincided with me as to the advisability of an immediate operation. I waited about three days, when, as she was getting worse, I operated. I found the appendix in the same condition as in the before-mentioned case.

The first case mentioned has had scarcely any trouble since the operation. The last case has had colic and sensitiveness at times since the operation, about fifteen months ago. This past month she had a very severe attack, but there is no appendix there and probably no adhesions. Neither case suffered nor had any fever after the operation. The wounds healed immediately without suppuration.

The above considerations have made me think that perhaps appendicitis (the mild, recurring cases) may again be relegated to the physician. If we can recognize the preceding

condition and can manage this, probably the number of surgical cases may be much reduced. I believe that even if we knew that mucous colitis were present, when the symptoms of appendicitis are pronounced, we should operate. If the true disease is not there it will be later, when we may be too late. I am advocating the treatment of the preceding disease, not of those cases where the appendix is involved. I believe these should remain surgical cases.

Now in regard to the treatment of these cases I will begin by saying that I have found no specific. Nothing much is recommended in the articles I have read except general tonic and building-up treatment. In one of the first cases I had I was led to use the constant galvanic current, merely to relieve the suffering. I did not want to give narcotics of any kind, as the patient was certain to take to them. I found that the electric current of a strength of from 20 to 140 milliampères passed directly through the abdomen for twenty minutes or less gave relief lasting often for two and a half days.

Some cases got well, and some were much improved. I have recorded about twenty-five cases.

I have used ichthyol in many cases, sometimes in conjunction with electricity. I have seen cases get well under this alone. The daily dose has varied from twenty to sixty grains, given in pill or capsule.

If this paper will help to direct the attention of the profession to the frequency of this disease and cause individual study I will have accomplished all I can hope from it.

VESICOVAGINAL FISTULÆ.

By M. C. McGannon, M.D.,
Nashville, Tenn.

Ever since man was born of woman openings between the bladder and the vagina have resulted as one of the untoward results of childbirth.

The earlier writings upon medicine, it is true, do not abound with descriptions of this loathsome disease, but those of the century past are rich with pen-pictures of vesicovaginal fistulæ and the heroic and glorious efforts of surgeons toward its cure—efforts that are justly called heroic and glorious because they required the patience and perseverance and courage of heroism to have been crowned with the brilliant results which were theirs.

Up to the early part of the century past I am not aware of any cures being recorded from operations done for vesicovaginal fistulæ, and even the few cases that were successfully treated before the middle of this century failed to leave any lasting impression upon the medical world. So much is this true that it may be safely said that up to 1850 the condition was thought by the profession to be incurable.

Dr. Marion Sims, in the *Story of My Life*, speaking of his first investigations in 1845 for the treatment of this disease, used the following language in referring to a case of vesicovaginal fistula that had been brought to him: "I have consulted all the authorities I can find—a fistula in the bladder, whether big or little, is absolutely incurable." This very case to which Dr. Sims referred in the above quotation was the one on which he did the first operation in

that series of surgical experiments which resulted in a priceless boon to the world, since through them and their publication by Dr. Sims the medical profession had it thrust upon them that vesicovaginal fistula was *not* an incurable disease. From that time until the present the principles of the operation gradually have become better understood, and improvements in the technique of the operation itself have been and are constantly being made, but perfection has not yet been reached.

The essentials for success in the repair of fistulæ between the bladder and the vagina are a knowledge of the anatomy of the parts, proper denudation and adjustment of the surfaces to be united, and, above all, absence of tension or dragging along the line of sutures.

The failures experienced and recorded by the early operators for this affection were due to one or more of the causes I have just mentioned. The anterior vaginal wall and the wall of the bladder where they lie in apposition were not sufficiently recognized as individual structures that might be separated with advantage in the closure of large openings.

Tension of the parts, producing dragging upon the sutures, was early seen to be a cause for failure of union, and attempts were made to overcome this by lateral incisions in the vaginal wall. The part that sepsis played in preventing a cure, fortunately, has been for many years recognized and obviated.

The walls of the vagina and bladder are distinct and may be separated without danger or damage to either; the uterus is easily dissected free from its connection with the bladder wall, and the vesico-uterine fold of peritoneum may be pushed up and the peritoneal covering of the bladder itself separated from that viscus. The blood-supply, coming as it does from the posterior division of the internal iliac in those branches that penetrate the bladder wall in its front, middle, and upper parts on either side, cannot be interfered with in isolating the bladder; hence its nutrition is secure under every circumstance.

A knowledge of these facts enables the surgeon in every case to separate the bladder from its connections sufficiently to close the opening, be it large or small.

In looking over the history of this operation we find the names of the best gynecic surgeons of this country in connection with its evolution: Marion Sims, T. A. Emmet, Battey, Bozeman, Lee, Hunter, Munde, Currier, H. M. Sims, Dudley, Kelly, Marcy, and others; while foreign surgeons have been by no means behind those of America in lending their aid toward perfecting its technique.

Marion Sims pared the edges of the fistula and secured union by bringing them together. Tension on the sutures caused failure in many of his cases.

T. A. Emmet, that deep-thinking leader of plastic surgeons, soon recognized the part that tension played in causing failure in this and other plastic operations about the vagina, and sought to overcome the difficulty by making lateral incisions and sliding the vaginal tissues in such fashion that the edges of the fistula could be approximated without dragging upon the suture line.

Alexander Hugh Fergusson, of Chicago, in May, 1892, employed vaginal flaps to cover-in the opening between the bladder and vagina, which, though ingenious, could hardly be considered as a distinct advance.

In 1894 Mackenrodt, of Berlin, conceived of a plan of operation the principles of which are suitable to all of these fistulæ. He separated the bladder from the vagina and sutured each independently. Since that time Charles P. Noble, Howard A. Kelly, and Henry O. Marcy have each applied this principle in different ways, with marked success.

Until this common-sense procedure was devised large fistulæ were deemed incurable. This is proved by the fact that so good a surgeon as H. M. Sims, of New York, reported to the New York Obstetrical Society in March, 1893, a case of incurable vesicovaginal fistula. I quote from the *New York Obstetrical Journal* his words: "The anterior wall of the vagina and the base of the bladder are entirely destroyed,

leaving no vaginal margin, either laterally or antero-posteriorly. The obliteration is as complete as though it were done with a punch; this permits the posterior walls of the bladder to evert themselves through the opening where the base of the bladder formerly was, and there, in full view, are the two ureteral openings, welling up with urine every few seconds. An operation on such a case being out of the question I could only send the poor girl back home."

A diagram of the condition accompanied the text (see *New York Medical Journal*, vol. iii., p. 415). The drawing showed that the urethra and the vaginal wall anterior to the junction of the urethra and bladder were in existence—a state of things identical with a case I shall relate.

This paper was discussed by Dr. Gill Wylie, Dr. Edebohls, Dr. A. F. Currier, and Dr. Pryor, none of whom took issue with Dr. Sims; and as these men were and are all surgeons of high rank it is evident that in 1893 the profession deemed this class of cases incurable.

To-day there is no excuse for these cases being uncured or being only relieved by such mutilating operations as turning the uterus into the bladder to close the opening, or closing the outlet of the vagina and making an opening above the pubic bone through which the urine may be poured, as water out of the spout of a teapot, by up-ending the body.

By separating the bladder from its surroundings to the extent necessary any fistula, be it large or small, may be closed.

I have applied this principle in six cases during the last two years, with primary union and complete closure of the fistula in every case. The technique in each was the same, and I shall briefly outline it in detailing one case which, because of the extent of the injury, is worthy of being recorded.

The patient, a young woman, aged thirty-three years, was referred to me by a medical gentleman who lives in the State of Tennessee. She was a farmer's wife in poor circumstances. She had always been able to do not only her house-

work but also, at times, to help in the fields. She was the mother of three living children. Three months before she came under my care she had given birth to a monster presenting anterior *duplicity*. After a labor of six hours one head passed through the vulvar outlet, but for twelve hours more all efforts at delivery of the rest of the child were futile. After consultation, as the child was dead, it was decided to make a supreme effort at extraction by pulling upon the presenting part. The result was the delivery of a well-formed child with two distinct, symmetrical, separated heads, fused at the shoulder.

There were two necks and between them an elevation like the ending of a shoulder. The outer shoulders were natural, and from the point of one to that of the other across the back measured nine inches. Immediately after delivery it was observed that the rectovaginal septum had been torn through; four days later there was no control over the escape of urine from the bladder.

Upon examination I found the external parts much excoriated from constantly being bathed in urine; the vulvar surface gaping, the rectovaginal septum divided half-way to the cervicovaginal junction, and the anterior vaginal wall and the base of the bladder gone from three-quarters of an inch behind the meatus urinarius to the cervix, the anterior lip of which was partly destroyed. From side to side the opening extended from one lateral vaginal wall to the other. The left ureter opened upon the junction of the vagina with the bladder, but the left emptied itself high up in the vaginal vault.

On March 31, 1899, three months after the date of injury, under chloroform anæsthesia, I passed a ureteral catheter through the urethra and into the ureter on the left side, as a guide, that I might avoid injuring that tube during the operation. I then dissected the bladder free from the uterus behind and separated the peritoneum from a portion of its fundus until I could bring the separated part forward to that portion of the bladder still remaining at its junction with the

urethra. I then separated the bladder from its lateral connection for about an inch on either side, so that when the posterior part was brought forward and united with the anterior, in a crescentic line, there was no tension at any point. Fine catgut was used throughout to unite the bladder walls.

In introducing the sutures near the ureter care was taken to roll its opening into the bladder, but at the same time not to cause any constriction of its calibre. The catheter, passed through the urethra and into the ureter, was left *in situ* for twenty-four hours, and then removed.

After closing the bladder the widely separated edges of the anterior vaginal wall were brought together as nearly as possible, but a large space was left to close by cicatrization.

Silkworm-gut was used for these sutures in the vaginal wall. At the end of a week the silkworm-gut sutures were removed and the bladder was found to be closed. An opening was now made in the line of closure on the right side near the lateral vaginal wall, from which I intended later removing a strip of mucous membrane with which to lengthen the ureter on that side. The ureter, as I before stated, emptied high up in the vault of the vagina. Before making this extension to the ureter I wished the cicatrix in the anterior vaginal wall to become firm.

Thirty days after the first operation the patient was again anæsthetized and a strip of mucous membrane freed from the lateral vaginal wall, beginning in front of the small opening left in the bladder and continuing to a point behind where the ureter opened in the vaginal vault. A denudation, one-quarter inch wide, was made on the anterior vaginal wall around the opening into the bladder and back to and around the opening of the ureter. This flap, raised from the lateral vaginal wall, was folded over and united with silkworm-gut sutures to the denudation just described, on the anterior vaginal wall, forming a tube leading from the ureteral opening in the vaginal vault to the opening made in the bladder. A ureteral catheter was passed through the urethra along the

new channel and into the ureter. This was allowed to remain forty-eight hours and removed. Union took place at once. The sutures were removed at the end of six days.

The urine flowed along the new channel into the bladder without leakage from the time of the operation, and now more than a year has elapsed and the urine still continues to flow through this artificial ureter without trouble. It only remained to repair the rectal wall, anal opening, and pelvic floor, which was shortly afterward done, and the patient went home cured. This woman has remained since as well as she ever was in her life.

In each of the other five cases to which I have alluded the bladder was separated from the vagina and closed with fine catgut, care being taken to secure without tension perfect approximation of the edges of the opening. Afterward the vaginal walls were as far as possible brought together.

In closing I wish to emphasize the fact that the chief essential to success in operations for vesicovaginal fistulæ, whether of large or small size, is closure of the bladder opening without tension upon the suture line. The vaginal wall may be disregarded.

DISCUSSION.

Dr. Willis G. Macdonald, of Albany, N. Y.—I have been very much interested in listening to the paper presented by Dr. McGannon and his results in a condition very difficult to deal with. Some of the procedures adopted by the essayist are quite new to me, particularly the latter part of the operation, or the method of reintroduction and extension of the ureter and its communication with the bladder. It is a far more valuable method of doing that than to do an abdominal section—loosening up the portion of the urethra invaginated in the fold of the vagina and reimplanting it into the bladder at a higher point—in that it presents far less technical difficulties. Unfortunately, this is one of the papers which is extremely difficult to discuss, because the doctor has said about all that is to be said in relation to the matter that he has presented to us. The new

use of the method of separating the posterior wall of the bladder from the anterior wall of the uterus is a great advantage in some of these serious cases in which we have a large defect to close. There is in any of these cases very little room left for the suprapubic and intravesical method of operation. I am sure that in years gone by, in dealing with similar conditions, I would have done far better to have operated by the method just presented than to have made a suprapubic cystotomy and operated within the bladder in the cases I had to deal with, and even going so far as to close the vagina entirely in some of the serious cases in elderly women. None of these plans have been entirely successful. I have succeeded on one or two occasions in operating by the suprapubic method presented by Trendelenburg some years since, but with relation to the whole subject I dare say that with those men who have been operating for some considerable time the number of cases of vesicovaginal fistula is becoming less and less. In my early days of surgery as an assistant and in early operative work I had occasion to operate for the cure of vesicovaginal fistula more frequently than I have done in recent years, and this indicates definite progress on the part of our obstetricians. Personally I hardly feel competent to speak upon this proposition, because of the fact that in the last five years I have had the opportunity to operate so infrequently on cases of vesicovaginal fistula. In a considerable service, which scarcely amounted to more than two or three cases during an entire year, in most of them I succeeded very well with the old method of Dr. Sims, doing it in the year 1900 practically in the same manner as he did it, using the same style of instruments, with perhaps a better Sims speculum. The cases that have been described by the essayist present a series of difficulties to surgeons all the way along, and in the paper so well presented there is not much to be discussed except to remark that the doctor has done a beautiful operation in the most scientific way.

Dr. McGannon (closing the discussion).—I wish to thank Dr. Macdonald for what he has said about the operation I did in these cases. I desire to emphasize one point which was not touched upon in the paper. These larger openings such as are shown in the diagram cannot be closed by the ordinary operation as described by Dr. Sims and as practised by Dr. Emmet

in days gone by. Up to 1894, when Mackenrodt brought forth the principle of separating the vaginal wall from the bladder wall, such an operation could not have been done; it was practically impossible. I saw Dr. Emmet operate twice upon a patient on whom he had previously operated a number of times, and when he had by dexterous plastic surgery so slid the tissues that tension had been done away with he succeeded in closing the opening. The opening was not as large as the one you see in this diagram. It is a case upon which he justly prided himself on account of the result. By separating the bladder from the vagina and uterus and from the peritoneal covering you can close any of these openings by one operation.

SUPPLEMENTARY REPORT (*a*) ON A CASE OF LITHOLAPAXY; (*b*) ON A CASE OF VESICORECTAL FISTULA.

By George S. Brown, M.D.,
Birmingham, Ala.

Mr. President and Gentlemen: At the meeting of this Association held in New Orleans last year I read a paper on the subject of litholapaxy, reporting four operations on three patients. The first two patients, aged respectively fifty and seventy-three years, operated upon four years ago, have remained free from any bladder symptoms up to the present. The third patient's case is one of some interest. During the ten years prior to his coming to me he had four suprapubic cutting operations for stone, one or more stones being removed each time. The last one of these four operations was done in November, 1898. On May 27, August 15, and December 9, 1899, I operated upon him with the lithotrite, removing a soft, phosphatic stone each time. When he came on December 9th it was discovered that he had a small fistula in the suprapubic scar, which only leaked a drop now and then when the bladder was full. This fistula suggested a buried suture as the possible local cause of so many recurrences. That there was a local cause seemed certain, and he was advised to submit to another cutting operation, so that a thorough search could be made for it. He refused, however, on the ground of not having the time to spare, and another (the third) litholapaxy was accordingly performed. He went home the same day and went back to digging coal the next. He was entirely well until February, 1900, when

all the symptoms returned, suddenly as usual. The patient himself was positive that the new stone never gave any trouble while it was forming, but that all the symptoms began suddenly when it came loose from somewhere and tumbled free in the bladder.

The bladder was opened for the fifth time above the pubes and a soft stone, as large as a buckeye, was removed. Careful search was made for any buried suture that might have been left after one of the former operations, which, hanging free in the bladder, might make a nucleus for stones to grow upon. No suture was found, however, but deep down in the neighborhood of the right ureteral opening a fine, sharp point was felt. This was discovered after searching the same neighborhood several times negatively, arguing that at times this sharp point of a sacculated stone must have been concealed by a fold of mucous membrane. A good deal of difficulty was experienced in dilating the small mouth of the saculation (which was probably the ureteral mouth) sufficiently for the delivery of a stone the size of a hazel-nut. The fragments of this stone explain, I think, all this patient's trouble during the past twelve years. The smooth, small piece marked No. 1 was the uric-acid nucleus which came down the right ureter about fifteen years ago. He says he passed many such about that time. This one, instead of passing, lodged in the ureteral mouth and accumulated a phosphatic deposit in concentric layers about it, constituting the stone. The small, flat end of No. 2 is the end which projected into the bladder and upon which grew the ten secondary stones which were removed. They were deposited and broke off and were removed, one after another, and the cause was not discovered until the last operation, which was done with the deliberate purpose of searching for a local cause.

It is the generally accepted opinion now that there is always a local cause; and I may say, in passing, that there are two local essentials to the formation of a stone, viz., infection and the retention in the bladder of some foreign substance which will act as a nucleus upon which the salts of

the urine can be deposited. Infection alone is not sufficient, because as long as the particles of mucopus in a cystitis are washed away with each evacuation of the bladder no stone will form, but if these are retained in a cul-de-sac, as in the case of an enlarged prostate, one is very likely to form; on the other hand, stone may come down from the kidney, but unless it brings infection with it no secondary deposit will take place upon it until it has been long enough in the bladder to cause irritation and subsequent infection.

It is now nine months since the last operation, and the patient remains well, and will, I am sure, continue so.

My sixth and last litholapaxy was done in January, 1900. The patient was a man, aged sixty years, who had suffered for six years and had been very much debilitated and emaciated for the last year. This man kept his bed longer than any of the others on account of his previous condition, but he was up on the fifth day. From the very first all of them sat up on the side of the bed to urinate. The man upon whom I operated so often never missed but one day from his work at any time.

In regard to the danger of injury to the bladder I will say that from the first all of these patients expressed themselves as feeling better after the operation; that even the pain along the urethra on passing urine, due to the irritation of the lithotrite, was nothing compared to that caused by the stone. When the bladder is distended with water there is very little danger of catching the mucous membrane, because all the folds are smoothed out. During the first five of these operations the water was more or less tinged with blood; this did not amount to anything and was probably altogether from the urethra. At the last operation the water was not even tinged All the patients had a little septic fever before operation, which always disappeared promptly afterward.

At the Memphis meeting of this Association in 1898 I reported a case of vesicorectal fistula, the history of which was briefly as follows: When a boy of five and a half

years the patient had a perineal operation for stone in the bladder, during which an opening was accidentally made through into the rectum, constituting a vesicorectal fistula, through which the urine constantly passed. By far the greater number of these accidents result in urethrorectal fistulæ; in fact, I have been unable to find an account of any other case of vesicorectal fistula.

Dr. J. P. Tuttle, of New York, three years ago collected the notes of twenty-five cases, all of which were urethrorectal. In the latter form of the injury the urine escapes into the rectum only during a voluntary effort to void, while in vesicorectal fistula the dribbling from the anus is constant. During the first year following the perineal operation this boy submitted to four operations, all of which were unsuccessful attempts to close the fistula. He was then neglected for eight years under the impression that nothing could be done for him. When he was brought to me in January, 1898, he was thirteen years old, but small for his age, very anæmic, and had chronic bronchitis. I operated upon him several times without success and did not cure him until the inguinal colostomy, which I had made to divert the fecal current, had been open six months. Most probably this time was necessary for the seat of operation to become clean after the fecal current had been diverted. A month after the fistula was cured the colostomy was closed and dropped back. After the cure the dribbling from the rectum was, of course, at once relieved, and while he had no incontinence while lying down, it was complete at first while standing. A few weeks later, or about the time I reported the case at the Memphis meeting, he had gained a little control and his bladder then had a capacity of about two ounces before any escaped. At the time of my first examination I found the anterior portion of the sphincter ani and the corresponding wall of the rectum, up to and including the circumference of the fistula, a mass of hard scar-tissue, the results of former efforts to close it. It seemed impossible at the time that any of the normal structures about the neck of the bladder

could have escaped destruction. After the fistula was closed it was feared that owing to this he would have two incurable complications to afflict him. The one was that the circular muscular tissue of the neck of the bladder had been so completely destroyed that he would always have incontinence while on his feet.

In the discussion which followed the reading of my paper Dr. Kelly said that in time it was probable the bladder would develop circular muscle enough to control the urine, basing his opinion on the slight improvement that had already taken place. This prophecy has been justified by the slow but steady and pronounced improvement the patient reports. At present he has no leakage until the bladder contains four ounces (which may be its full capacity). It will be recalled it remained empty and contracted for eight years, so that no doubt it is now rather infantile in size. The other complication feared was that the seminal ducts had been destroyed, and this cannot now be determined, for although he is a hearty, growing boy and there is nothing abnormal in the appearance of the external genital organs, as yet they are the undeveloped organs of a child, no sign of puberty having made its appearance.

SOME LIFE-SAVING MEASURES IN OBSTETRIC WORK.

By R. R. Kime, M.D.,
Atlanta, Ga.

It is not the intention of the writer to present anything novel or new, but to call attention to some procedures and remedies that have proved of value in obstetric work, often saving life.

It is self-evident in this day that aseptic deliveries with complete emptying of the uterus are essentially life-saving measures. The physician who fails in either adds mortality statistics in proportion to his failures. Leaving out of this discussion instrumental deliveries, Cæsarean section, symphysiotomies, etc., we have, as I consider, the most important life-saving measures:

1. Saline infusions.
2. Medicinal remedies.
3. Serum treatment.
4. Hydrotherapy.
5. Drainage.

In cases of placenta prævia and postpartum hemorrhage, saline infusions or intravenous injections are of prime importance not only to sustain life immediately, but to lessen susceptibility to infection and hasten recovery. In infection after labor, with marked prostration, saline infusions act well in many cases, diluting toxins, adding volume to circulation, favoring elimination by skin and kidneys, and in some instances tending to check the virulence of the infection.

Strychnine and digitaline are well-tried remedies and

worthy of confidence. In many instances they have sustained life and stimulated the vital energies, braced up a weak heart, and carried the patient over dangerous lines until nature came to the rescue.

Quinine in ten-grain doses renders valuable aid in sustaining the patient, modifying the course of infection, and counteracting the effect of absorbed toxins.

The serum treatment has not yet fully established its claims, but gives promise of utility where streptococci have been demonstrated to be present.

The cold bath or pack in cases with high temperature is often of value, but the hot-pack is more so, especially in weak, anæmic patients. It favors elimination—cutaneous and renal—tones up nervous systems, and tides over the critical period in many instances.

Elimination by skin, kidneys, and bowels are potent factors in puerperal infection, while drainage, uterine and vaginal, are life-saving measures.

I do not mean to indorse but to urge against the common practice of curetting and tamponing the uterus in cases of septic infection following labor at or near full term.

By uterine drainage I mean the use of as large a soft-rubber tube as the cervix will admit, with a strip of gauze about the same length carried into the uterus along with and by the side of the drainage-tube; this double tubular and capillary drainage to be kept up the first few days in severe cases, and then ordinary tubular drainage with a soft or hard-rubber drainage-tube will answer.

Irrigation of the uterus and cleansing the tube once or twice in twenty-four hours is sufficient. Strong antiseptic solutions are contraindicated. They irritate the parts, interfere with nature's process of repair, while mild solutions of boric acid, sterilized water, or normal salt solution cleanse the parts, do not irritate, and aid in repair of the endometrium.

In draining the uterus apply the same principles as are used in abscesses and septic infections in other parts of the body.

What are the indications in abscess of the appendix, the brain, or any part of the body? Free drainage. What would the surgeon advise in septic infection of the hand or foot involving the lymphatics of the arm or leg?

When once free drainage is established, with proper cleansing and disinfection of the part, the local condition improves, the adjacent lymphatics are relieved, and constitutional symptoms subside.

The greater the lymphatic and vascular supply the more active the infection and the greater need for elimination, with adequate drainage.

Let us remember the physiological hyperplasia of tissue that takes place in the pelvic organs of the female during pregnancy; also remember the retrograde changes that occur after labor, with the process of absorption and elimination, adding to these the traumatisms that occur during labor, and what would be a rational conclusion in cases of infection? If nature in normal cases establishes a process of elimination by way of the womb, let us profit by nature's example in cases of infection.

If free drainage is the guiding principle elsewhere in the body, why should the uterus be an exception?

If free drainage will relieve abscess and infections extending to the lymphatics in other parts of the body, why not in the pelvic organs?

Uterine drainage in puerperal infection is doubly imperative, nature having established the precedent in normal cases to eliminate effete material, which process is often checked by the infection. At this time the parts are in such condition as to form a hot-bed for germ development and their rapid absorption.

To my mind a more ideal condition demanding efficient drainage could not be found. I am fully convinced that a fair and impartial trial of combined tubular and capillary drainage in these cases will convince the most skeptical and prove its utility.

Vaginal drainage is a life-saving procedure under two con-

ditions: First, where we have pus accumulation in the pelvis threatening the life of the patient that cannot be safely removed by abdominal section; second, in cases of infection where the inflammatory process continues to spread in spite of uterine drainage and other remedies referred to in this paper.

With hysterectomy in septic infection after labor I have had no experience, as I have not had occasion to resort to such a measure since learning how to use uterine drainage efficiently.

To illustrate some points in this paper I report briefly a few cases that have occurred in the last six months.

Case I.—Mrs. L., primipara; husband had gonorrhœa before marriage. The patient had a vaginitis and cervicitis, which were relieved by local treatment. At the fourth month of pregnancy I removed by continuous strip a lot of warty growths surrounding the posterior three-fourths of the vaginal outlet. Labor normal; no lacerations. Twelve days after labor she had slight elevation of pulse and headache; temperature, 99° F.; next day slightly increased. Third day she had two chills; temperature nearly 105° F.

I found the uterus large and containing a half-pint or more of pus. Irrigated, inserted double uterine drainage, and gave the usual remedies. Drainage-tube collapsed and bent at the cervix, obstructing drainage; hence but little improvement in the first twenty-four hours. After that a rapid improvement, reaching a normal temperature in a few days. The patient recovered, with the pelvic organs normal.

Case II.—Mrs. H., aged twenty-two years; primipara. I called to see her September 2d, then seven and a half months pregnant, suffering with acute articular rheumatism involving all four extremities; pulse, 115 to 120; temperature, 102° to 103° F. Labor occurred the second day afterward; normal in character; no lacerations. Temperature on the day of labor ranged from 99° to 100° F., and after that gradually increased each day, reaching above 106° F. about

six days after labor, developing a severe rash over the body, very red and angry looking, cuticle soon peeling off in large flakes. The patient had scarlet fever when a child. Large doses of antirheumatics, quinine, etc., had no influence on the temperature. The womb was investigated and found large, flabby, seven or eight inches deep, bleeding easily; on irrigating flakes of endometrium slipped off, leaving raw surfaces, which were soon covered with diphtheritic deposits. Double drainage used; antirheumatics and quinine continued. The temperature was reduced by cold wet-packs. On the second day heart-failure followed. Cold applications; heart controlled by hypodermatics of strychnine, nitroglycerin, and digitalin. After this the hot-pack was used, which acted well, increasing elimination. The patient was also put on a rubber cushion filled with tepid water, the cushion reaching the whole length of the spine. Uterine drainage kept up until the temperature became normal. She had considerable inflammatory deposits in the pelvis, but gradually recovered, with the pelvic organs normal; a slight difficulty with the joints yet remains.

Case III.—Mrs. L., aged twenty-one years; primipara. Miscarriage at about four or five months. Two physicians in charge tried to empty the uterus with instruments, causing great pain. Some four or five days afterward a third physician took charge and called the writer in consultation. Found the patient in a marked septic condition; temperature, 103° to 104° F.; pulse, 120 to 140°; abdomen distended, tender, and tympanitic; abundant pelvic exudate; uterine wall and cervix sloughing. Removed some débris from the uterine cavity with forceps, not curette; irrigated and instituted double drainage, giving the usual remedies. The patient's general condition improved. The uterus rapidly assumed a healthier condition; practically normal in a week. At this time a vaginal incision was made and the abscess cavity drained. The patient made a good recovery, is stout and hearty, and only complains of some pains at menstrual periods.

DISCUSSION.

Dr. I. L. Watkins, of Montgomery, Ala.—I do not know that I can add anything of interest to what the essayist has said on this subject. In a brief manner he has given us some very valuable points. The subject is of considerable importance and one which, as a rule, is very little appreciated. The necessity of giving proper attention to the woman at the time he speaks of every man recognizes. Arguments have been advanced against the so-called antiseptic or new midwifery by several members of the profession, consequently many patients object to it until they have some experience. While theoretically some contend that all of these paraphernalia are needed and are beneficial in connection with confinement cases, still there is an indifference shown by a large number of the profession in relation to this practice. There is no question in my mind about the great advantage to women, as well as to the babies, in observing the rules that the doctor has laid down. It is difficult in the country to get physicians to observe these rules. Yesterday, in a discussion, a gentleman stated that in later years of gynecological work he had done very few operations of a certain class. He referred especially to vesicovaginal fistula. I am quite sure that gynecological work would be very much easier and less if these rules were adhered to.

I want to take issue with the essayist in regard to the recommendation of drainage. I notice that very generally the uterus is referred to as being something similar to an abscess in any part of the body; that when it is inflamed it should be dealt with the same as an abscess in any other part of the body. I do not think the essayist means that exactly or that there are physicians who concede that is the case. This idea of placing foreign bodies in the uterus for the purpose of procuring drainage is, in my observation, not a very safe or good one. In an organ constituted as it is, so much opposed to any foreign element, I do not think we can make it parallel with an abscess in the back or hip and therefore pack it full of foreign material and expect it to behave in the same manner. The uterus will try to get rid of whatever material or foreign body may be placed in its cavity under these circumstances, and I think even pure car-

bolic acid applied to the endometrium would have the same argument against it. Introducing a tube and gauze into the uterine cavity for the purpose of producing contraction defeats the very thing we are trying to establish, namely, that of involution. As the tissues during the puerperium are susceptible to infection they are very much more liable to become infected then than at any other time, and I think the little excitement produced by a foreign body in the cavity might cause trouble. This is my idea also in regard to packing the uterus after ordinary curettement. I believe a great deal of harm results from the ordinary gauze tampon when left in the uterus after curettement. There is more or less violence done to the uterus during a curettement and then packing it. I have noticed in wards where women had been curetted and their uteri packed that they would cry out with pain, and I remember on a number of occasions to have asked about this, and the nurses would say that these women were hysterical; that they had a little gauze in their uteri. The pain was undoubtedly caused by the presence of the gauze, and when gauze packing is done it causes a certain amount of damage. The same rule is applicable to those cases discussed by the essayist this morning. Such treatment not only produces traumatism of the adnexæ and pelvic tissue, but also obstructs more or less real drainage of material which the uterus is trying to rid itself of. Instead of these gauze packings my idea is to resort to frequent irrigation, and I think the essayist is perfectly right in advising these milder forms of irrigation, such as the free use of saline solutions, boric acid, hot water, etc. Hot water, after all, is the thing that does the good. We irrigate the uterus if the symptoms demand it. The uterine cavity may be irrigated five or six times in twenty-four hours, and most cases would be benefited after the first few hours by that kind of irrigation. Instead of irrigating the uterus in the morning and afternoon and leaving the patient alone and anticipating the result, it should be irrigated until the temperature goes down and kept up when the temperature begins to rise again. I do not think it is wise to use bichloride solution as strong as 1 : 500, which has been used as a stereotyped practice in some hospitals. In Mount Sinai Hospital it was the practice of the nurses to give a 1 : 1000 bichloride solution and in some cases to give 1 : 500, and the tempera-

ture would go down. My observation is that this is entirely unnecessary and that weak solutions of boric acid or of permanganate will answer every purpose. I think it is much better than the gauze or tubal drainage suggested by the essayist.

Dr. Walter P. Manton, of Detroit, Mich.—I have listened with a good deal of interest to the paper of Dr. Kime and congratulate him on the success which he has achieved in his cases by this method of drainage. It seems to me that the most important point of all in these cases is the diagnosis. We may have septic infection outside of the uterus or the condition which in old-fashioned times was called sapræmia, in which the poison is being constantly absorbed from the uterine cavity. In the majority of these cases the diagnosis can be made—that is, the septic focus or foci can be located—but this is not always possible. While I heartily approve of drainage where the uterine cavity is filled with septic material, I am inclined to think, from a limited experience, that there is altogether too much done in that line of work. I recall a case which recently occurred in the practice of a physician of my acquaintance, in which irrigation and tinkering was kept up, and the woman died. Had she been left alone after the preliminary curetting and irrigation she would in all probability have recovered. If the trouble is located in the uterine cavity I am an advocate of cleansing that cavity. In this class of cases we usually find some material in the uterus. As I pointed out in a paper a number of years ago, there may be only a small spot of the endometrium involved, in which instance the septic symptoms may come on late, sometimes as late as the twentieth day. If we have a septic condition of the uterine cavity the proper thing to do in the first place is to curette, and I am a believer in the sharp curette and not the dull instrument. I tell my students that the man who is competent to curette the uterus at all is capable of using the sharp curette, and if he cannot do so without perforating the tissues or going too deeply into the muscular structure of the uterus he is not competent to use the instrument at all. After the curette has been used thoroughly the cavity should be washed out, and it makes very little difference what we use in the way of antiseptics. Personally I prefer a weak solution of carbolic acid for this purpose, but normal saline solution answers perhaps just as well; then

inserting a small tube, or, as I usually do in this condition, a little strip of gauze for drainage, we have done all that is usually necessary. I do not do a very large obstetric practice at present, only taking a few cases each year to "keep my hand in," as this is my department in medical school work. I see a number of these cases described by the doctor every year in hospital and consulting practice, however, and I find that the interior of the uterus is involved in a good many instances. If the foci of infection are outside of the uterus then it is quite unnecessary in the majority of cases to interfere with the uterine cavity. We must direct our attention elsewhere. The essayist spoke of the use of normal saline solution as a measure in tiding patients over, and with this I quite agree. I have seen a good many cases of hemorrhage following labor where the patient's life was unquestionably saved by the transfusion of normal salt solution. I find that the old method of injecting the solution into the rectum will, in some cases, answer the purpose as well as injecting under the breast.

Dr. James T. Jelks, of Hot Springs, Ark.—There are two or three points in the class of cases under discussion which the essayist did not bring out. In the first place we may have a sapræmic infection where the patient will recover with curettage and washing out of the uterus without any difficulty. These patients suffer from toxin absorption and if proper measures are instituted they all get well. On the other hand, if the patient has a staphylococcus or streptococcus infection the case is different. Staphylococcus infection means a slow infection. These patients practically all get well. It is different when we have a streptococcus infection to deal with. According to Whitridge Williams, this germ travels through the tissues at the rate of one-third of an inch an hour; hence if the patient has been ill for some time, even six hours, you can understand that curettage of the uterus is not going to stop the trouble. The infecting agent has progressed beyond the reach of the curette; it has gotten beyond the uterus and something else must be resorted to. You have to use either antistreptococcic serum injection or saline infusions or give strychnine and whiskey. With your saline infusion, etc., you stimulate the emunctory system and get rid of the toxins. I would suggest the use of the microscope for the purpose of differentiating the form of infection at the time

you are called to see the case. If you have a case of streptococcic infection to deal with you will not continue to wash out the uterus and use the curette. On the other hand, if you have a case of staphylococcus infection nature will wall off the infected area and the patient may get well, though for a while she may suffer from the formation of one or more abscesses, and these will require your attention.

Dr. Kime (closing the discussion).—If there is any question upon which I have firm convictions it is as to the management of cases of infection. In regard to septic infection and sapræmia, if we are called in and curette the uterus in a case of sapræmia and wash out the uterine cavity the patient will get well in the majority of instances; but if we have a case of streptococcus infection and curette the uterus and fill it with gauze I am satisfied that in many instances we will have sealed the death-warrant of the patient, because, as has been stated, the curette will not remove the germs which have extended beyond the reach of that instrument. If the infection has progressed far enough to produce severe constitutional disturbance it is beyond the reach of the curette. This is one argument against the question of hysterectomy in these cases—you cannot reach all of the infectious material that has passed beyond the womb. It is in this class of cases, gentlemen, after from ten to fifteen years working on this line, that I have evolved the idea set forth in this paper.

As to the question of whether or not we are introducing a foreign substance, if the streptococci have entered the uterine cavity and invaded the uterus itself and the tissues in the pelvic organs and produced constitutional disturbance, it is fair to presume that the infection has spread beyond the reach of instrumental interference. It is in these cases I wish that everyone of you could watch the results of the treatment I have outlined. When you curette these patients and tampon the uterus with gauze and watch them afterward you will see a great many of them grow worse on account of the infection being beyond your reach. It is in this class of cases that I urge you to institute tubular and capillary drainage and watch the results as soon as elimination is established. I agree with the remark that a foreign substance in the uterine cavity tends to obstruct elimination, but if you insert a tube in the uterine cavity alongside of a strip of gauze the infective material will be eliminated and not obstructed.

Let it start up uterine contractions; that is the thing you want. The method of drainage I have outlined will help the process of elimination. It will eliminate material not only from the uterine cavity itself, but the uterine body, lymphatics, and other pelvic tissues—the very thing desired in such cases to hasten subinvolution. By this method of drainage and elimination the septic infection and a variety of septic germs will be thrown off and not taken up by the system. I have seen the discharge almost entirely checked in some cases, then within forty-eight hours after introducing drainage, securing elimination, see the discharge re-established. In virulent cases of infection, after the establishment of free drainage, I have seen the uterus assume a healthier condition in three or four days, the diphtheritic deposits peeling off, and a healthy granulating surface underneath. If you have tried this method and watched it practically for days and years, as I have done, I am satisfied that a great many of you who are now averse to it would be firmly convinced of the value of elimination secured by means of tubular and capillary drainage combined.

A RAPID AND SIMPLE OPERATION FOR GALL-STONES FOUND BY EXPLORING THE ABDOMEN IN THE COURSE OF A LOWER ABDOMINAL OPERATION.

By Howard A. Kelly, M.D.,
Baltimore, Md.

I have dwelt elsewhere (see *Medical News*, December 16, 1899) upon the importance of utilizing an abdominal incision which is over 8 cm. in length for the purpose of investigating the condition of all the important viscera which are accessible to touch, provided the condition of the patient is satisfactory and there is no technical objection to the slight delay involved. I desire now to speak of a simple and satisfactory method of removing stones in this way when found in the gall-bladder.

When the incision is made in the lower part of the abdomen, either in the median line or, as I have made it in one instance, over the site of the vermiform appendix, the hand is introduced into the abdomen hugging the abdominal wall, conducted up over the omentum and the colon as far as the liver, where the gall-bladder is easily discovered in its notch on the right as a somewhat tense or flaccid sac filling the fissure and projecting out a little beyond the hepatic border. It is my practice to squeeze the gall-bladder and note the rapid collapse showing that the cystic duct is pervious. If there is a stone present it is easily felt through the thin walls by palpating from the cystic duct up toward the fundus. In order to remove a stone, if the gall-bladder is much distended, it should first be emptied by compression between

the thumb and two fingers; this allows the stone to be grasped, or, rather, hooked up by the first and second fingers to the top of the gall-bladder, where the stone is then lifted firmly up against the abdominal wall, which is thrust forward until a distinct eminence appears on the skin surface just below the margin of the ribs. Care must be taken not to allow any loop of intestine or the margin of the liver to intervene between the bladder and the abdominal wall.

An incision about 4 or 5 cm. in length is now made with the free right hand, down through the abdominal parietes over the eminence directly upon the stone, cutting straight through layer by layer in a vertical direction. The pressure from within keeps the tissues anemic as skin, fat, and muscle are successively divided. The white peritoneum is easily recognized, and on reaching this layer a little nick is made and the two edges caught with mosquito forceps; as the peritoneal incision is made a little larger, the gall-bladder with the stone appears in the incision, is opened, and its edges caught as the incision is made large enough to evacuate its contents; the stone may then clear the opening suddenly and land on the floor some distance from the table. The edges of the gall-bladder, held up by four of Halsted's delicate mosquito forceps, are now united by a fine silk suture beginning at one end of the incision and continued to the other, embracing all the coats but the mucosa. The same suture is then continued back to the starting-point as a quilted suture, burying the first layer, when the ends are tied together. If the gall-bladder is normal I do not hesitate to drop it without a drain. If the walls are diseased I drop the gall-bladder after closing with interrupted sutures and insert a small drain provisionally. The abdominal wound is then closed and the operation completed within a few minutes of its commencement. There is no danger of contamination of the peritoneum with bile, as the gall-bladder is drawn well up into the parietal incision and the peritoneal opening thereby closed.

One of the first cases in which I resorted to this mode of

discovering and removing a gallstone was under the following unusual circumstances: The patient was a man, aged about forty years, in the care of Dr. Yost, of Glen Rock, Pa., to whom I am indebted for the opportunity of seeing and treating him. He had always been healthy until he was stricken with typhoid fever, November 1, 1898. Previously both his wife and daughter had been severely ill with the same disease and he had nursed them himself and remained in almost constant attendance. In its onset and in its course his attack was a typical one. For the first ten days the temperature in the morning was 101° F.; in the evening 102.5° F.; for the succeeding ten days the morning temperature was 102.5° F., the evening temperature 104° to 104.5° F.; after this there was a gradual defervescence for three weeks, followed by a slight recrudescence for a week, when the evening temperature reached 103.5° F. He was free from fever at about the thirteenth week. The bowel symptoms were never severe, there were no bloody discharges and no tendency to constipation, but there were abdominal pain and slight distention. There was never any jaundice during the entire course of the attack. During the latter part of February, 1899, he had a slight attack of colic about the umbilical and the right iliac regions, with some tenderness, lasting three or four days. After this the convalescence progressed in a perfectly normal manner, with a fair appetite, digestion, and nutrition.

At three o'clock in the afternoon of March 20, 1899, he complained suddenly of a severe colicky pain in the umbilical and right iliac regions, which increased steadily in spite of warm applications, hypodermatic injections of morphine, and enemata of hot water; the pain was associated with some retching, slight vomiting, and a desire to defecate frequently without result, he passing neither fecal matter nor any of the water, of which one gallon was injected. Dr. Yost then fearing perforation of the bowel telegraphed for the writer, who operated, with the aid of Dr. Thomas R. Brown, at 9 P.M., March 21, 1899.

The appendix seemed to be the likeliest seat of the trouble, so the incision was made over the right iliac fossa. When the abdomen was opened it was found filled with thin, watery, somewhat sticky fluid of a dark color, but with no odor. There were no evidences of suppuration, but the intestines, uniformly injected and lack-lustre, showed a general peritonitis. The appendix was normal, save the general injection covering its surface. Inasmuch as the color of the fluid in the abdominal cavity suggested bile, the incision was enlarged, the right hand and forearm introduced, and the liver palpated. No rent could be detected in the collapsed gall-bladder, but a single large stone was distinctly felt.

Proceeding then on the assumption that the gall-bladder was ruptured, the stone was caught between two fingers and pressed up against the abdominal wall by means of the hand inside the abdomen; then with the other hand the overlying tissues were cut through until the gall-bladder was exposed, excised, and its edges caught with artery forceps on either side, when suddenly a large, clear, shining biliary calculus popped out and fell on the floor, rolling toward a crowd of some seventeen spectators, friends of the family, crowded into the little attic room to witness the operation.

The point of rupture could not be found, therefore the incision in the gall-bladder was sutured to the abdominal opening and the bladder drained with several pieces of narrow iodoform gauze. The lower incision was also drained, after thoroughly washing out the abdominal cavity, with washed-out iodoform gauze.

The convalescence was uneventful; the temperature never rose above 100° F., although the pulse continued high for several days after the operation. The stools were somewhat constipated, of a gray color and clay-like consistency for about five weeks, when they gradually assumed a normal color as the cystic fistula closed and the bile resumed its natural channel. The discharge of bile through the fistula was very free for eighteen days and then ceased quite abruptly. The drains were removed gradually, the last piece

being taken out on the thirty-third day. The urine was dark colored for about four weeks, when it gradually assumed a normal color. The patient had never previously passed any biliary calculi to his own knowledge.

FIG. 1.

The left hand, covered with a glove, is introduced through the incision above the symphysis; the gall-bladder is found and the stone pushed up into the fundus and against the abdominal wall, where it makes a decided prominence. The free hand is next engaged in liberating the stone by cutting directly down through the tissues of the wall until the bladder is opened and the stone escapes.

The gallstone was about 1.5 x 1 x 1 cm., purely translucent and entirely without any traces of pigment; the analysis showed that it consisted of pure cholesterin.

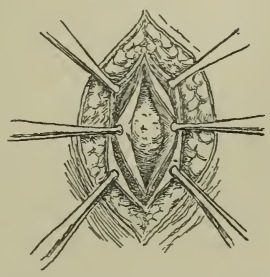
Cultures made subsequently from the abdominal cavity and from the bile as it issued from the fistula and from the centre of the stone, in the hope that typhoid bacilli might be found, proved negative. A chemical examination of the fluid obtained from the abdominal cavity showed that it

contained the biliary pigments and the glycocholate and taurocholate of soda. It was, therefore, certain that there was a rupture of the gall-bladder and that the severe abdominal symptoms had been produced by the peritonitis set up by the irritating biliary salts.

The patient came to my office ten months later with his incisions perfectly healed and in excellent health.

In addition to the case just related I have operated upon seven others, all women.

FIG. 2.



The incision in the abdominal wall, showing the deep fascia held up by four and the incised gall-bladder held open by two pairs of mosquito forceps. The stone is seen in the middle ready for delivery.

CASE II. was a difficult hysteromyomectomy, performed April 1, 1899, on a married woman, aged thirty-nine years. After checking all the hemorrhage in the pelvis, the right arm was introduced and the other abdominal viscera palpated. A large, irregular stone was found in the gall-bladder; this was caught by two fingers and pushed up into the fundus against the abdominal wall. With a scalpel in the left hand the tissues were then divided in a vertical direction until the gall-bladder was exposed, when it was incised and its edges secured with forceps; the incision was then enlarged and the stone, which was black and about 4 x 3 cm. in diameter, was pushed out. The gall-bladder was drawn out of the wound to one side and surrounded by gauze until the opening was closed by mattress catgut sutures; the abdominal wound was then closed over the gall-bladder,

after which the abdomen below was also closed without drainage. I saw this patient twenty months after the operation in greatly improved health, without any complaints referable to the operation.

Case III. was a woman, aged thirty-two years, operated upon April 22, 1899, for a myomatous uterus, from which two tumors were removed, together with one left broad ligament myoma. The uterine incisions were all closed with catgut, after which the remaining abdominal organs were examined through the incision. The gall-bladder was found to contain two stones, which were removed as in Cases I. and II. The incision in the gall-bladder was closed with interrupted catgut sutures, after which both abdominal incisions were closed without drainage. The recovery of the patient was uneventful.

Case IV., a patient of Dr. August Horn, of Baltimore, was a married woman, aged sixty years, with a large multilocular cyst of the right ovary. After removing the cyst, in palpating the other organs the gall-bladder was found to contain stones. The abdomen was lax and the gall-bladder was drawn down near the upper end of the wound, which extended almost to the umbilicus; after surrounding it with gauze it was cut open and the stones removed. The opening was then closed with two rows of mattress sutures of fine silk, easily applied in the thickened walls of the bladder. The abdomen was washed out and the wound closed without drainage. The stones were all dark in color, the largest one being 3 cm. in diameter.

The convalescence was uneventful and without pain; the highest temperature was 100.5° F., on the second day.

Case V. was a patient of Dr. Fry, of Washington, operated upon May 23, 1900; the patient, aged forty-eight years, had a large ovarian cyst; after removal of the tumor, in palpating the other abdominal organs the gall-bladder was found choked with a mass of large stones; it was pushed up against the abdominal wall and opened by a longitudinal incision and twenty stones removed, varying in diameter

from 3.5 to 1 cm. The gall-bladder was then sutured by interrupted fine silk sutures and dropped back into the abdomen with a small iodoform-gauze drain. The abdominal wound from below was closed completely. There was no leakage at all from the gall-bladder, and upon removal of the drain upon the seventh day the opening closed without suppuration.

Case VI. was a woman, aged fifty-three years, a patient of Dr. J. A. Evans, of Baltimore; she was operated upon October 18, 1900, for a large myomatous uterus filling the lower abdomen. The uterus was removed by hysteromyomectomy from left to right; in order to get it out, it was necessary to make a long incision up to the umbilicus. After completing the pelvic operation and examining the other abdominal viscera the gall-bladder was found shrivelled, white, and much thickened, and containing stones. The gall-bladder was drawn toward the upper end of the incision, its fundus incised, and two large black stones removed. The walls of the gall-bladder were about 0.5 cm. in thickness and moderately vascular; the incision was closed by interrupted fine silk sutures. The median abdominal incision was closed up to the upper angle, where a fine gauze drain was laid down to the gall-bladder. The patient made an excellent recovery, but with the discharge of a moderate amount of sticky fluid, evidently coming from the gall-bladder, which continued for several weeks.

Case VII. was a patient operated upon November 17, 1900, for a large myomatous uterine body filling the lower abdomen; it was necessary in order to get it out to make an incision extending from the symphysis up to the umbilicus. After taking out the tumor and palpating the other abdominal viscera a stone was found in the gall-bladder. This was then removed by drawing down the liver and pulling up the long incision to the right side. After packing off the gall-bladder with gauze the incision was made and the stone extracted; the wound was then closed with silk sutures. No drain was used.

TABLE I.

No.	Initials.	Physician.	Date of operation.	Primary operation.	Stones.	Gall-bladder operation.
1	S.	Dr. G. P. Yost	March 21, 1899	Lateral incision over vermiform appendix.	One pure cholesterin.	Incision below the ribs. Gall-bladder sutured to abdominal opening, drain. Recovery.
2	M. G.	Dr. E. S. Fruitt	April 1, 1899	Median incision; hysteromyomectomy.	One large, rough, black stone.	Incision below the ribs. Gall-bladder drawn out of wound and surrounded by gauze. Closed by mattress catgut sutures; no drain. Recovery.
3	E. S.	Dr. D. B. Sprecher	April 22, 1899	Median incision; myomatous uterus.	Two stones; one the size of a horse-chestnut.	Incision below the ribs. Gall-bladder closed with interrupted catgut sutures. Recovery.
4	B. B.	Dr. A. Horn	April 9, 1900	Median incision; multilocular cyst of right ovary; wound extended almost to umbilicus.	One large stone, 3 cm. in diameter, and several smaller ones; dark in color.	Gall-bladder drawn down near upper end of median incision, isolated with gauze, opened; closed with two rows of mattress silk sutures; no drain. Recovery.
5	L. H.	Dr. Henry D. Fry	May 23, 1900	Median incision; large ovarian cyst.	Twenty stones, 3½-1 cm. in diameter.	Gall-bladder exposed by an infraeostal longitudinal incision. Closed by interrupted silk sutures. Small iodoform gauze drain; no discharge. Recovery.
6	J. T.	Dr. J. A. Evans	Oct. 18, 1900	Median incision; large myomatous uterus; hysteromyomectomy.	Two large black stones.	Gall-bladder drawn down into median incision and stones removed. Closed by interrupted silk sutures. Fine gauze drain to gall-bladder. Recovery, with discharge of some sticky fluid for several weeks.
7	M. S.	.....	Nov. 17, 1900	Median incision; large myomatous uterus; hysteromyomectomy.	One clear cholesterin stone.	Gall-bladder packed off with gauze and incised through large median abdominal incision. Gall-bladder completely closed with silk sutures.
8	R. C.	.....	Nov. 24, 1900	Median incision; large fibroid uterus; hysterectomy.	Thirty-two small stones, 1½ cm in diameter and smaller.	Gall-bladder drawn down into median opening and incised. Closed by two layers of fine silk sutures; 1st, mattress; 2d, continuous.

CASE VIII. was a woman, aged forty-four years, upon whom I performed hysterectomy for a large fibroid uterus filling the lower half of the abdomen; it was necessary, in order to remove the mass, to extend the incision from the symphysis pubis up through the umbilicus and 8 cm. beyond it. After completing the pelvic operation and examining the rest of the abdominal viscera, a long vermiform appendix was found buried in adhesions and concealed behind the colon; the right kidney was movable, and the transparent gall-bladder was seen full of stones from 1.5 cm. in diameter and smaller. Dr. G. B. Miller, who completed the operation, opened the gall-bladder and removed thirty-two stones, closing it by two layers of fine silk sutures.

Dr. Peters finds, upon going over my anæsthesia slips, that I have dictated notes as to the condition of the gall-bladder in forty-nine cases, and stones have been found and removed in 8 per cent. of these.

I offer no apology for removing these foreign bodies by an operation so simple and so safe when the abdomen is once opened for some other more serious cause.

I need but to refer to the distressing sequelæ of a cholecystitis, or a cholangitis, once the stones give rise to an infection and afford by attrition of the mucosa the portal of entry in the surrounding tissues, or, on the other hand, to the miseries of a patient whose stone has begun to wander down toward the duodenum. A still more cogent reason is perhaps found in the frequency with which stones are associated with cancer of the gall-bladder.

In connection with my recommendation to remove gall-stones whenever they are discovered in this way, the question of their relative frequency becomes a matter of considerable importance.

Naunyn (*Klinik der Cholelithiasis*, Leipzig, 1892) quotes the frequency of gallstones from the pathological records of the following clinics:

Peters (Kiel)	5 per cent.
Rother (Munich)	6 "
Fiedler (Dresden)	7 "
Schloth (Erlangen)	7.2 "
Roth (Basel) I.	9 "
Roth (Basel) II.	10.9 "
Frank (Vienna)	10 "
Schroeder (Strassburg)	12 "

Schroeder's material, covering all ages, shows that there is a remarkable increase in the percentage according to age:

Age	Sections.	Cases with gallstone.	Percentage of gallstone cases.
0–20	82	2	2.4
21–30	188	6	3.2
31–40	209	24	11.5
41–50	252	28	11.1
51–60	161	16	9.9
60 and over.	258	25	25.2

Of these it is remarkable that 4.4 per cent. were in men and 20.6 per cent. in women, and it is stated that stones were found much more frequently in women who had borne children.

I am not aware that statistics of any considerable number of cases have ever been presented from this country. With the permission of my colleague, Professor William H. Welch, I asked Dr. Clelia D. Mosher, assisting me in my private gynecological work, to review a thousand autopsies made in the Pathological Department of the Johns Hopkins Hospital to investigate this point. The results of Dr. Mosher's excellent labors demonstrated that biliary calculi were found in 59 cases, or 5.9 per cent.; in 31, or 4.8 per cent., of the males and in 28, or 7.8 per cent., of the females.

DISCUSSION.

Dr. W. E. B. Davis, of Birmingham, Ala.—Mr. President: The abdominal incision for pelvic conditions furnishes a splendid opportunity to examine for disease of other organs in many cases, but I am convinced that we would make a mistake to explore the abdominal viscera after the method recommended by Dr. Kelly in all cases. At any rate it would be dangerous

to make it a rule, for by so doing we subject the patient to additional traumatism, or the general operator would, and it is not necessary to do this in every case.

Coming to the operation for the removal of gallstones, if there is one operation in abdominal surgery that is simple and attended with comparatively little danger it is cholecystostomy, or, rather, cholecystotomy. I am impressed with the fact that in doing this operation the majority of operators would accomplish the result better in the old way. We make a small opening, pass the finger down very gently from above, and pull the gall-bladder up. Nothing can be added to render it easier than Mr. Tait made it. Marion Sims, of Alabama, first performed the operation, and his technique has been but little improved upon. You have the opportunity by this technique of walling off the field of the gall-bladder and protecting the general cavity from the escape of bile, which may be infected.

Dr. A. M. Cartledge, of Louisville, Ky.—I would suggest in connection with Dr. Kelly's paper the desirability in most cases of seeing and investigating the gall-bladder and of having it well protected by a gauze pad, because frequently there is more or less suppuration connected with gallstones, and I do not think it would be desirable in all cases to open the abdomen in the manner suggested by Dr. Kelly. If there are calculi present we ought to subject the gall-bladder to incision under protection. While Dr. Kelly has encountered in succession three or four cases of solitary stones and has operated in the manner he has described, those cases are exceptions, because generally we have a great many stones of variable sizes, so soft that counter-pressure could not be used in the way he describes. I fully believe in exploration of the bladder. I disagree with Dr. Davis in that respect. A large percentage of the patients who come to us complaining of indigestion are suffering from gallstones. The gall-bladder is one of the organs which it is more important to explore than the appendix if the incision will permit when we are in the abdomen, and if we find gallstones the little additional time it takes to make an incision over the gall-bladder and place a pad around it is comparatively trifling, and we do no harm by this measure. I do not think it would be wise, however, to do this in most cases. We might do so in a few instances where the gall-bladder is relaxed and we have a

solitary or a few stones to deal with, but it is better, as a rule, to have the gall-bladder under protection.

I shall not say anything at this time in regard to the relative merits of cholecystostomy and the so-called ideal cholecystotomy, or immediate suture of the gall-bladder.

There is one point that has not been mentioned so far as I have observed, namely, that the recurrence of gallstones is almost unknown after operation for their removal. It is true many such recurrences have been reported, but I find on investigation and in talking with my professional friends that the gallstones were not all removed at the first operation. In a series of seventy cases I have never had a recurrence. Drainage of the gall-bladder does much to prevent the recurrence of gallstones, and, aside from the immediate suturing of the gall-bladder, I do not know but what it is a good plan to drain the bladder after the removal of calculi. I take them out when found and always search for them.

IRREDUCIBLE INCARCERATED RETROFLEXED GRAVID UTERUS.

By William A. Quinn, M.D.,
Henderson, Ky.

The pregnant uterus may become retroflexed from great laxity of the uterine ligaments or guy ropes which constitute the sling that holds the organ in position. It may become incarcerated by adhesions formed before conception takes place or by the cervix pressing against the pubic arch, lifting the bladder up out of the pelvis, elongating the urethra, and preventing perfect evacuation of the urine, which has a tendency to force the fundus down under the promontory of the sacrum. Softening of the lower segment, which takes places in the gravid uterus, lessens its self-support and its resistance and robs it of its natural power to rise out of the pelvis and correct its position.

These conditions are not infrequent, and as a consequence retrodisplacement is the commonest form of abnormal position of the womb that is met with in childbearing women. With the persistence of the conditions which cause the retroflexion, and the rapidly increasing size of the uterus, it soon becomes incarcerated and cannot free itself. If the condition is recognized by or before the end of the third month, if adhesions and other complications are absent, often it is only necessary to thoroughly evacuate the bladder and lower bowel and the uterus will free itself, or it may sometimes be necessary to place the patient in the knee-breast position and even to administer an anæsthetic to restore the organ to its normal position. Lusk, in his work on *Obstetrics*, men-

tions sixteen cases by E. Martin, in four of which spontaneous reposition followed the evacuation of the bladder and in eleven reposition was accomplished in the knee-elbow position. No amount of skill is equal to a physical impossibility, and it is quite remarkable that Lusk, who is an acknowledged authority on obstetrics and has done a large consultation obstetrical practice for many years in New York City, never met with a case of irreducible incarcerated gravid uterus.

One very prominent etiological factor in the causation of this condition which is not mentioned by any of the authorities on obstetrics is unrepaired former injuries of the pelvic floor. An incarcerated retroflexed gravid uterus, with the fundus snugly fitted down into the hollow of the sacrum under the promontory, meeting with no resistance from the pelvic floor as pregnancy advances, goes on increasing uniformly in size until at about four and a half months it will be found to have so moulded itself to the pelvis as to become irreducible.

Barton Cooke Hirst, in his work on *Obstetrics* (page 213), gives an illustration from a frozen section of irreducible retroverted uterus of three and a half to four months, with death from rupture of the bladder. On page 212 he mentions a collection of fifty-one fatal cases. The following, in order of frequency, were the causes of death: Uræmia and exhaustion, rupture of the bladder, septicæmia, peritonitis from inflammation of the bladder, pyæmia, rupture of the peritoneum and of the vagina, errors in treatment, and gangrene of the colon.

Mrs. S., a white woman of average intelligence, the wife of a farmer, had had previously four normal labors. In her first labor she sustained a complete tear of the perineum. Her menstrual periods had always been normal and regular. In eight or ten months after each of her first labors she began menstruating, but after the fourth labor it was about two years, after which the periods came on and continued regular and normal every month until the month preceding the

operation. She had never had a miscarriage. I saw the case about the middle of July in consultation with Dr. Dunn, her attending physician, who informed me that in his opinion it was an irreducible incarcerated retroverted gravid uterus. He stated that he and his colleague, Dr. Johnson, had carefully emptied the patient's bladder and placed her in the knee-breast position; had exhausted their skill in efforts to replace the mass, but failed to accomplish it; that they then gave her an anæsthetic and tried again, but without success. On examining the patient I found the bladder enormously distended, reaching into the abdomen to a point about two inches above the umbilicus. It was emptied with difficulty by catheter. A large, hard, unyielding mass, which completely filled the pelvic cavity, was found. The perineum having been previously torn, the tumor pressed low down upon the pelvic floor.

It was with difficulty that the index-finger could be insinuated into the vagina or rectum, and it was no easy matter to introduce a catheter into the bladder. The os was found flattened out against the pubis and as high as the length of the vagina would let it rise, and could be reached with difficulty. The flexure, which was very acute, was situated just above the internal os. The rectum was pushed hard against the sacrum until only soft, ribbon-shaped feces could escape. With the hand on the abdomen, feeling through the thin wall, the mass was found to curve very slightly from the arch of the pubis toward the promontory of the sacrum, under which it fitted snug and fast. Upon the most careful conjoined manipulation absolutely no elasticity or fluctuation could be made out. It seemed to be as unyielding as the hardest fibroid, and gave one very much the same impression that one of those cases does in which a large myoma will form a perfect cast of the pelvis and become impacted so tightly that after the abdomen is opened it has to be dragged out of its bed with obstetric forceps and by sheer force. Medicine being of no avail and a spontaneous cure being out of the question, and all efforts at relief by manipulation

having signally failed, as a last resort we were driven to surgical interference.

The patient was removed to the sanitarium and on the morning of August 3d a median incision, about four inches long, was made, which exposed a very remarkable and unusual sight, namely, the uterus in extreme retroflexion, the fundus bearing down hard upon the perineum, the organ much resembling a tumor with a twisted pedicle. Efforts were made to replace the uterus in its normal position, but with poor success, so that finally it was lifted into the abdominal cavity. The tissues, which were softened and extremely vascular, had broken down under my hand. A quick decision had to be made as to the best course to pursue. It was concluded that if I closed the wound and allowed the uterus and appendages to remain, with all of the necrotic tissue, the infection already existing would be increased and, in all probability, death would ensue from septic peritonitis. Extirpation promised the best result and it was done as follows: A thread of cable silk was passed around the uterus just above its junction with the vaginal vault and the uterus amputated through the neck, the uterine arteries were secured, and the stump transversely closed with a row of interrupted catgut sutures. The cable silk ligature which had been thrown around the mass was removed and the stump dropped back into the pelvis. Just before closing the abdominal incision I noticed that the cavity was rapidly filling with blood. A quick examination revealed that the tissues had given way under the ligature. Checking the bleeding vessel with a hæmostat and with a curved needle, another ligature was placed about half an inch down and tied. The cavity was sponged out, but the hemorrhage still continued, and the right vessel was also found in bad tissue, the ligature having partially cut through. This was also tied again. Further examination proved that there was still bleeding and that neither ligature was holding. By this time things began to look pretty squally and there was great danger that the patient would die on the table from hemor-

rhage. The bleeding-points were caught and rapidly tied, the work being done almost entirely by touch. Finally, about an inch and a half below the point of the first ligature, sound tissue was found that held the ligature all right, so that bleeding was controlled. The cavity was quickly washed out with hot normal saline solution and left full. The wound was closed with silkworm-gut sutures by the through-and-through method and the patient put to bed.

Upon examining the specimen the uterus was found to contain a fœtus, the arrest of development of which seemed to have occurred between the fifth and sixth months of fœtal life. The low fever which had been present continued for two or three weeks and delayed what would have been an unavoidably slow recovery. But, remarkable as it may seem, this woman returned to her home in six weeks from the time of the operation and has since been able to attend to her household duties and to take care of her children.

I was not aware at the time of this operation that abdominal section had ever been advised or practised before for irreducible incarcerated retroflexed gravid uterus. The most recent works on obstetrics make no mention of it and it was original as far as I was concerned. When I began to write this paper, however, I searched the literature on the subject and found that cœliotomy had been done in similar cases by seven surgeons, namely, Mann, Cameron, McLean, Smith, Da Costa, Fry, Bovée, and in several instances, as in my own case, it was done without the operator knowing it had previously been done.

The uncertainty of the diagnosis before operation was the experience of some of them.

To Dr. Matthew D. Mann, of Buffalo, belongs the credit of first having done cœliotomy for this obstetrical complication. He reported two cases to the American Gynecological Society at its meeting held in Boston, May, 1898, the first of which was done in November, 1895. Dr. Mann mentioned in his paper the case of Dr. Murdoch Cameron, of Glasgow, occurring about one month later (December, 1895), and

reported in the *British Medical Journal* in 1896. The second case of Dr. Mann was operated upon July, 1897.

In the discussion of Dr. Mann's paper it was developed that Dr. H. L. Smith, of Montreal, had done the operation once through an error in diagnosis, believing that the woman had an ovarian cyst. In the same discussion Dr. Malcolm McLean reported that about three years previously he had encountered a case in which a portion of the uterus was fastened down under the promontory of the sacrum, while the remainder of the organ had extended up into the abdomen.

Dr. Henry D. Fry, of Washington, D. C., read a paper before this Association at its Memphis meeting, in 1898, entitled "Cœliotomy in the Treatment of the Incarcerated Pregnant Uterus when Irreducible," in which he reported a case on which he had operated in April, 1896. At the time he did not know that it had ever been advised or done previously, for he says: "As an alternative for abortion or hysterectomy a new method is here advocated. The gravid uterus, displaced and irreducible by the means that have been at our command, when manipulated from below is successfully replaced by operating from above. The abdomen is opened in the usual way, the fundus and the body of the uterus grasped with the fingers, and by manipulation directly applied in this way the displaced organ is lifted from its bed and brought into normal position."

Dr. J. C. Da Costa reported to the Section on Gynecology of the College of Physicians of Philadelphia, May, 1897, a case with adhesions and a cyst of the right ovary operated upon successfully, the patient being delivered of a healthy child at full term. In commenting upon this case Da Costa says: "This operation seems to justify the ground that I have taken for some years past, that the proper way to treat a retroflexed pregnant uterus which is bound down by adhesions is to do a cœliotomy to free it."

According to Mann, the alternatives which have been given us up to the present time in cases of retroversion of the gravid uterus with incarceration are either to replace the

organ, or, that being impossible, to empty it, the argument being that if we leave the uterus displaced the death of the mother and child will result, whereas if we empty the uterus the mother may be saved although the child may be lost.

This teaching, in the light of recent experiences in abdominal surgery, should be changed; and if it be found impossible by the most approved methods, including the use of an anæsthetic, to replace the uterus the abdomen should then be opened and the fundus pulled up by the hand introduced behind it. If the uterus be so large as to completely fill the pelvis, efforts at replacement through the vagina will fail, not because the uterus is too large to be forced through the pelvic brim, but because, filling completely the pelvic cavity when it is pushed up, nothing can enter from above to take its place, so that its progress is limited. The moment pressure is withdrawn from below atmospheric pressure forces the uterus down again into its old false position. This occurs even in the knee-chest position. The truth of this statement will be readily appreciated by anybody who has operated on one of these cases. Even if the uterus be soft and yielding it requires considerable manipulation to get it up, and it can be done only by letting out the air behind it. It must not be forgotten that pregnancy may exist when there are adhesions, and that these may be an insuperable bar to reposition until they are broken by the hand on the inside, thus giving another indication for operation.

A SOLID OVARIAN TUMOR.

By John G. Earnest, M.D.,
Atlanta, Ga.

Miss M., aged thirty-two years, unmarried, was seen June 24, 1900. She was a very small woman, with a narrow pelvis, and had been gradually losing flesh for several months, until she had become greatly emaciated; for months past had fever every day. There was constant pain in the pelvis, and she was very despondent, worn-out, and exhausted. She had a constant watery diarrhœa, which was occasionally interrupted by a few days' constipation and accompanied by great abdominal distention. This condition when occurring was relieved with difficulty, requiring active purgatives and free use of enemas. Nausea was a distressing factor. Temperature when first seen was 102° F. The menses had been regular until the last two months, when she began to have a little show at irregular intervals between the periods.

When the abdomen was uncovered a mass reaching above the umbilicus was observed. It stood out prominently in the median line, was perfectly symmetrical, smooth, and hard; was firmly fixed so that it could not be moved. The dark line down the centre of the abdomen was unusually pronounced. The examination per vaginam was somewhat hampered by an unruptured hymen and tenderness due to the local peritonitis, but I found the cervix pointing forward, low down, and twice its normal size; the uterus was retroverted, firmly fixed, and apparently continuous with the superimposed tumor. The rectal examination seemed to

confirm the view that the uterus and tumor were parts of the same body. The fundus uteri could not be reached through the rectum. I believed it to be a uterine fibroid. She declined operation until she could go to her home and build up under the care of her family physician. This she did, returning August 1st. On August 3d I opened the abdomen. There was a small amount of light-yellow ascitic fluid. The abdominal peritoneum was mottled with dirty brown. To my surprise the tumor showed the pearly lustre of an ovarian tumor. It had so grown that it seemed to be caught under the promontory of the sacrum and was adherent to the pelvic wall. It was gotten out of the pelvis with some difficulty. The pedicle was from the right side and comparatively small. The tumor when removed was found to be ovoid in its general outline, with an indenture corresponding to the promontory of the sacrum, and measured twenty centimetres in length and about fourteen in breadth at its widest point.

When cut open the appearance was very much that of an ordinary uterine fibroid, and the tissue was quite dense. The cortex was united to the tumor by a thin layer of cellular tissue infiltrated with serum. I am sorry to add that no microscopical examination was made.

I at first supposed it to be a sarcoma, but careful examination showed the fibres to be distinct and arranged in irregular whorls just as we see them in uterine fibroids, and the tissue was quite as hard as any fibroid and absolutely solid, without a break. The recovery was uninterrupted.

DISCUSSION.

Dr. Virgil O. Hardon, of Atlanta, Ga.—Mr. President: The paper of Dr. Earnest has interested me considerably because this matter of solid tumors of the ovary is one which has been forced upon my attention from my having encountered several such cases within my own practice in spite of the rarity of the condition. They form about 2 per cent. of all ovarian tumors, according to Greig Smith, but in my experience they have been

less frequent. It is true that my limited number of seven hundred abdominal operations is not a sufficient basis for a percentage.

There is one point in regard to solid tumors of the ovary which is important with reference to diagnosis—it is commented upon by all writers who have written upon the subject and it is confirmed by my own observations of the cases I have seen—and that is that solid tumors of the ovary are always accompanied by more or less ascites. In the cases I have seen the amount of ascites has been considerable: it has been enough to obscure the diagnosis, to produce distention of the abdomen, and to lead to the supposition at first that the abdominal dropsy was due to some one of the more common causes; and in all the cases I have seen the diagnosis had previously been made of disease of the liver or of the kidney or some one of the causes which usually produce ascites.

The first case that I operated upon for solid tumor of the ovary was one that corresponds closely with Dr. Earnest's description of his case; but microscopical examination showed that it occupied, as these tumors are said by the authorities to occupy, a situation on the border line between sarcoma and fibroma, so that in many instances it is impossible to say that it belongs distinctly in either class. His, a German authority, goes into the subject pretty thoroughly and says it is absolutely impossible in many cases to differentiate between ovarian fibroma and sarcoma. One peculiar feature of such tumors if they be sarcoma is that they do not in their history present the degree of malignancy that sarcoma does in other situations; that patients can carry these tumors in their bodies for a considerable length of time and the only inconvenience experienced from them is ascitic distention of the abdomen. They do not interfere with the general health as sarcoma does in other parts of the body, and this is probably due to the fact that they are not distinctly sarcomatous. Another variety of solid tumors of the ovary which has come under my observation in two cases is papilloma. I do not mean papillomatous cyst, which is comparatively common, but a superficial papilloma developing upon the surface of the ovary, and these cases were so rare at the time I did my first operation that only seven had been reported. Dr. J. Whitridge Williams, of Baltimore, in a monograph

entitled "Solid Tumors of the Ovary," has investigated the subject fully and has been able to collect but twenty-six cases among operators throughout the world. My first case is among those which he collected. Since then I have operated at the Grady Hospital upon another case of superficial papilloma of the ovary, the papilloma, as in the previous case, growing from the peritoneum covering the surface of the ovary. In these cases there is some ascites invariably present, as the history of all collected cases shows. In one case of papilloma of the ovary upon which I operated, the first one, there was recurrence of the disease in five months. This I expected, because the parietal peritoneum had become infected and there were small growths of the same character upon it, which I removed; but the probability is that there were others that I did not remove, and the disease therefore recurred. In the other case there was no recurrence; the tumor was confined to the ovary and did not infect the peritoneum or any other part of the abdominal cavity.

These four cases—two of fibrosarcoma and two of papilloma of the ovary—represent all that have come under my observation, and they all presented ascites as one of the most characteristic features. I have become impressed with the idea that these tumors are often overlooked; that the ascites is ascribed to other causes; and that a thorough pelvic examination in such cases for which no other indication would exist than the ascites might disclose a greater frequency of solid tumors of the ovary than the statistics would seem to show.

Dr. Earnest (closing the discussion).—I think the position taken by Dr. Hardon in regard to the presence of ascites in connection with solid tumors of the ovary is correct, because with what little experience I have had, having seen a few other solid tumors of the ovary, I have found ascitic fluid in the abdomen in every instance.

HYPOSPADIAS AND EPISPADIAS, WITH SPECIAL REFERENCE TO THEIR OPERATIVE TREATMENT.

By F. W. Parham, M.D.,
New Orleans, La.

The term hypospadias was introduced into science by Galen, and that of epispadias by Chaussier and Duméril. Although it was known to the ancients, being mentioned even by Aristotle, it remained a pathological curiosity until the beginning of the nineteenth century. But little was done in the first half of this century in spite of the work of the great Dieffenbach and of that Napoleon of surgery, Dupuytren. Nélaton, it is true, had in 1852 proposed and carried out, though with only moderate success, an ingenious plastic operation for epispadias, which, perfected by Dolbeau, is still in favor with some surgeons, but with this notable exception the plastic surgery of the urethra remained dormant until the publication of Bouisson's memoir in 1861. Duplay's valuable investigations were first published in 1874 and completed in 1880. Thiersch's admirable work was published in 1869. From these works most of the real progress of the past quarter has had its origin. But notwithstanding the brilliant work of these men, the possibility of relieving these distressing conditions has had by no means a wide recognition even among those who make surgery a specialty. A few works on surgery have given the subjects of hypospadias and epispadias thorough discussion, such as the *System of Surgery* of Duplay and Reclus, Morrow's *System of Genito-urinary Diseases*, and, most thoroughly of all works I have had access to, that of Le Dentu and Delbet (article by Légueu),

recently issued. (The last edition of Duplay and Reclus I have not been able to obtain at this writing.) The *Genito-urinary Surgery* of White and Martin as well as the *American Text-book of Genito-urinary Surgery* by Bangs and Hardaway have also very appreciative articles, which will prove useful not only to the student, but to the practitioner of surgery as well.

But the majority of the older works on surgery, as well as the most recent ones, give but scant consideration to the surgery of these distressing malformations, either discouraging any attempt to remedy them or absolutely declining to countenance their surgical relief at all.

Thus Erichsen (1873): "These conditions (hypospadias) are mostly incurable, though plastic proceedings have occasionally been devised and practised for their relief."

Holmes' *System of Surgery* (1882): "In the case of hypospadias surgery does not offer any favorable results. The case is one of arrested development, in which the construction of the parts is irremediable."

Reference Hand-book (1887): "Plastic operations can rarely be of service."

Stephen Smith's *Operative Surgery* (1887): "Treatment of hypospadias is advisable only when it appears to be inconsistent with the power of impregnation or when the opening is so small as to afford a real obstacle to the passage of the secretions."

Keyes' *Genito-urinary Diseases* (1888): "Mature surgical judgment cannot promise a cure from operative procedure in epispadias. The adaptation of a proper urinal is the best treatment. Operations for hypospadias are not over-encouraging, but rapid advances are now being made in this direction."

American Text-book (1899): "The glandular forms of hypospadias are of no physiological importance." Of epispadias: "An operation similar to that just described (Duplay's) is employed for its cure, but is often more troublesome and less successful than that for hypospadias."

Edmund Owen's *Surgical Diseases of Children* (1885): "Experience seems to suggest that this slight malformation (glandular hypospadias) had best be left alone." Again: . . . "In these cases (referring to the forms of peno-scrotal and perineal hypospadias) the aperture may require dilatation, but a plastic operation, with a view of carrying on the urethra to the end of the glans, should not be undertaken."

Dennis' *System of Surgery*, 1895 (article by White and Furness): "It cannot be said that the treatment of hypospadias ever completely meets all functional demands. To make a conduit for the urine is comparatively easy, although it is apt to be a tedious matter by reason of the liability of the sutures to give way. . . . When only the penile urethra is at fault the same operation (for epispadias) as for hypospadias may be performed, but the deformity of the penis is usually so great that it makes the operation almost useless." Park's *Surgery*, vol. ii., expresses no opinion as to the possibility of relief.

White and Martin's *Genito-urinary Surgery* (1897) not only countenances but encourages operations for the relief of both conditions.

The *American Text-book of Genito-urinary Diseases*, by Bangs and Hardaway (1898), takes decided stand in favor of the operations for both hypospadias and epispadias, but remarks of operations for epispadias: "The results of these operations are not so good as in hypospadias, as the development of the penis has generally suffered far more than in that condition and there is less material for flaps."

International Text-book of Surgery (1900): "Operations for the cure of balanitic or penile hypospadias are seldom successful. The method devised by Duplay is the best." Of epispadias: "Operations for this condition have been less successful than for hypospadias."

Of French works, those of Duplay and Reclus and of Le Dentu and Delbet are conspicuous examples of the thoroughness with which French surgeons keep in the van of progress

in all forms of plastic surgery; but it would be invidious not to commend here the admirable exposition of the subject to be found in the article by Tilden Brown in Morrow's *System of Genito-urinary Diseases*, issued in 1893.

Tillmanns, in his *Lehrbuch der Speciellen Chirurgie* (1890), says that the prognosis of these conditions has been materially improved by operative procedures, and with this view all the best German surgeons are in accord.

Finally, in controversion of the statement above quoted from Dennis' *Surgery*, that "it cannot be said that the treatment of hypospadias ever completely meets all functional demands," I would call your attention to the admirable result obtained by Prof. Duplay in an aggravated case related in a lecture delivered by him to his class at the Hôtel Dieu in 1896 (*Cliniques Chirurgicales de l'Hôtel Dieu, Première Série*, Paris, 1897, p. 224). He said: "We have even yet in the service a patient, recently operated upon with success, who had been entered at his birth as belonging to the feminine sex. During his whole childhood he had worn clothing of a girl; it was only at the age of fifteen years that the error was discovered and his civil state established. The penis in his case, however, although being altogether badly developed, had not undergone any notable curvature." Toward the end of the lecture he remarked of the results of treatment of hypospadiac cases: "As I have had occasion to demonstrate to my colleagues of the Société de Chirurgie, and as you may assure yourselves, on the young hermaphrodite male on whom I operated some months ago at the Hôtel Dieu, those results are perfect as well from the æsthetic as from the functional point of view." He concluded the lecture by saying: "Miction becomes in these conditions absolutely normal. The same is true of the genital functions. Not only is copulation rendered possible, but fecundation likewise, and I could cite you several examples of individuals afflicted with perineoscrotal hypospadias for whom coitus was absolutely impossible, but who, thanks to my surgical intervention, married and have become fathers of families."

Such cases, I believe, make further argument in favor of intervention in cases of this deformity unnecessary. It remains now only to discuss the various operative procedures which form the resources of the surgeon in attacking the different problems in this rich field of plastic surgery. First, it will be best to understand what faults are to be corrected; in other words, what are the lacking functions to be restored.

The physiological requirements may be summed up under three heads:

1. Typical urination, including the two ideas of control of its initiation and the proper direction of the stream.

2. To make coitus possible and normal.

3. To make fecundation possible.

All will be ready to admit that any operation that can accomplish all these æsthetic and functional desiderata deserves to have place among our valuable surgical resources. To admit meekly that "nature triumphs over art, and here is the boundary between what is godlike and human," making this our excuse for surgical *laisser aller*, is to negative the idea that the mind can inform the hand and give it such cunning as will enable it to do away with much of the *misery* with which erring nature has afflicted us. Let us now consider the different degrees of deformity and examine them to see in how far they may involve alterations of the normal functions of the genito-urinary apparatus.

We shall take hypospadias first. These may be conveniently divided, agreeably to the classification of Duplay (*Clin. Chir. de l'Hôtel Dieu*, 1897), into:

1. Balanic, referring to cases where the urethra ends on the glans.

2. Penile, including all cases where the urethra discharges between the glans and the scrotum.

3. Penoscrotal, including the cases where the urethra opens at the penoscrotal angle or just in the rear of it.

4. Perineoscrotal, those involving both perineum and scrotum.

In the first or balanic form, of which, according to the

etiological classification of Loumeau,[1] there are many varieties, there is ordinarily little interference with physiological function; hence these cases, it is generally agreed, will not often require surgical intervention. The surgeon should try to persuade the patient of the non-necessity of the operation; but as there are cases in which mental depression demands it the surgeon will be justified in undertaking it. It will be done otherwise for cosmetic reasons, but not on account of distinct interference with physiological function.[2]

In the second form miction is normal unless the urethral opening is near the scrotum, when the individual will have to take certain precautions against soiling the clothing; copulation is possible unless the penis shows a pronounced incurvation against the scrotum (this was proved in one case of Duplay's by the man having gonorrhœa). When the penis is strongly drawn against the scrotum even coitus will be constrained, and impregnation can scarcely ever result unless possibly in cases where the meatus is not far behind the glans. In this class of cases the indication for operation is formal and the more imperative the further the meatus urinarius is away from the glans, or, rather, the nearer it is to the scrotum.

In the third degree, the penoscrotal, the meatus opens at the junction of the penis and scrotum or somewhere behind this point and in front of the perineum, the penis and a portion of the scrotal urethra being, therefore, involved in the urethral hiatus, being completely or only partially without floor. With rare exceptions this form is nearly always accompanied by a curvature of the penis more or less pronounced, even in the flaccid state, and much more accentuated in the state of erection. Here all three functions are at a severe discount. Urination is extremely embarrassing, the individual so afflicted being in aggravated forms compelled to divest himself of his clothing to avoid wetting it

[1] Not less than eleven varieties have been depicted by Loumeau and Kaufmann.

[2] Beck's operation is so simple and effective that it may be done without hesitation in all balanic cases.

and being forced to take the position of a female in urinating. Coitus is, perhaps, not absolutely impossible in the less severe forms, but usually can be accomplished only by some subterfuge. A remarkable case is that reported in Gould's *Anomalies and Curiosities of Medicine*, where the patient actually married and by his mechanical ingenuity successfully deceived his wife for a long period. Fecundation is practically impossible. Operation here is absolutely demanded.

In the fourth form the deformity reaches its extreme degree, the scrotum being divided into two halvès, looking so like the labia majora as to deceive one without a careful examination. Tillaux, in his lecture (*Leçons de Clinique Chirurgicale*, 1895, p. 367), tells how he came very near making a serious error of this kind. The urethra opens at the bottom of this fissure. It might well be denominated false hermaphrodism. The case of Duplay's above described is a remarkable example of such a case, happily, however, restored by this surgeon's skilful hand to useful citizenship.

In this variety coitus is impossible; indeed, the more pronounced the erection the more the organ is bent forward. Fecundation, of course, is out of the realm of possibility.

Micturition is retromingent and necessitates a squatting position to avoid soiling the clothing. Such a sufferer can, indeed, bless the hand that reconstitutes him a man.

Up to the time when Duplay undertook his researches such cases were considered beyond the resources of chirurgical art, but now all degrees of hypospadias have been brought within the limits of operative surgery.

Having discussed the physiological requirements, let us see further in what manner the surgeon must proceed in order to attain them.

The initiation of micturition being fully under control, our surgery will not be concerned with that; we must, however, restore the power of properly directing the stream, and our success in accomplishing this will also in most cases be rewarded by a restoration of the functions of coitus and fecundation.

The indications, then, are:

1. To straighten the penis.

2. To restore the continuity of the urethra up to the normal position of the meatus.

1. For a successful method of doing this we are indebted to the genius of Bouisson (1861). He recommended a transverse incision through the band causing the curvature and then uniting the skin in a longitudinal direction. This will often suffice, but Duplay advised, if necessary, to cut the intercavernous septum, their sheaths, or, if need be, the cavernous bodies themselves.

Gross mentions (*Urinary Organs*, 1876, third edition, p. 559) that Physick, many years previously, had operated by taking out a wedge-shaped piece of the cavernous bodies and closing the hollow V by sutures. This he says was done also by the elder Pancoast in 1844, and he (Gross) himself had "practised it several times, with the most gratifying results." To this operation White and Martin object that the portion of the corpora in front of the repair-line would fail to participate in erection. Even, however, were this invariably true, the mere straightening of the penis would be a great gain in micturition at least. The difficulty of straightening the penis in some cases is well shown by dissection of a case made by J. L. Petit[1] (Wood's *Hand-book*, vol. v., p. 563).

Before the succeeding steps for restoring the canal are undertaken it is advisable to wait until all signs of inflam-

[1] He inflated the cavernosa, giving rise to the same curvature as seen during erection in the hypospadiac: the urethra was shortened and incapable of extension. He separated it carefully from the cavernosa, but the cavernous bodies when injected still lengthened themselves but little and the penis remained curved. He separated them from all other parts and drew upon both ends; when blown up they took the original curve. Attributing this to a band still remaining where he had separated the urethra, he removed this, where possible, without opening the cavernosa and cut it where it could not be removed. Inflated, the organ still took the curved position. He then dried the corpora while still inflated and cut one longitudinally, the other transversely; he found the cells nearest the urethra the smallest and gradually enlarging toward the convex side, where they were largest. Whether this vicious conformation was original or the result of growth could not be determined. Such cases are practically beyond the reach of our art; they are fortunately rare.

matory reaction shall have subsided; then the restoration of the canal will be much facilitated.

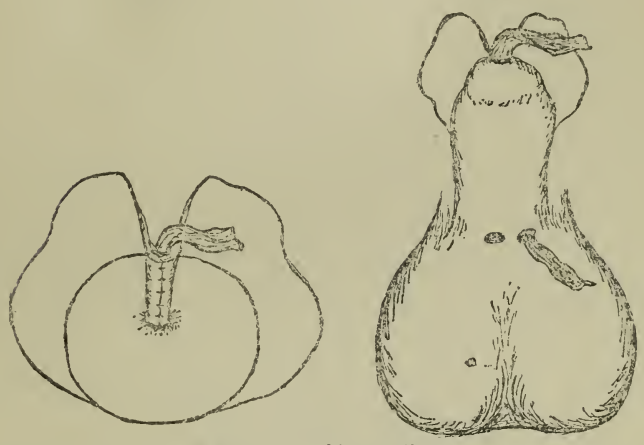
2. The restoration of the urethral canal. This includes the ideas of (1) simply making a continuous channel from the bladder to the end of the glans and (2) making it in such a way as to restore the function of ejaculation as well as that of urination; in other words, the channel must be so reconstructed of skin and, as far as possible, of erectile tissue as to be a fair substitute for the natural canal.

The desiderata are epithelial lining for the canal, thick and non-contractile walls in the penile portion, and spongy tissue in the glandular. Operations which have been suggested may be grouped under three heads: 1. Simple canalization or tunnelization. 2. Simple approximation. 3. Flaps.

Dieffenbach, in 1845, pierced the glans and left the canula in until cicatrization was complete. Chassaignac (*Traité des Opérations Chirurgicales*, vol. i., p. 839) credits Dupuytren with this suggestion, stating that this surgeon had cured two patients by this method, but how long they remained well he does not say. After examination of all the methods proposed up to his day (1856) he became convinced that they all had one technical vice: They all failed to assure the continuity between the old canal and the new. He carried out an ingenious technique for promptly connecting the two portions of the urethra. He introduced a grooved staff into the existing urethra, groove looking downward. A trocar was then pushed through the inferior wall of the urethra (at right angles to the staff), and having met it, and the staff being withdrawn, the trocar was pushed on through the glans until it emerged about where the normal meatus should be. A thread was drawn through and left as a guide; sounds of increasing size were from time to time carried through this new channel, thence on into the urethra and so into the bladder. Finally, the abnormal meatus was closed. But Chassaignac mentions no case which he had been able to follow for a sufficient time to say how long the canal remained patulous. Undoubtedly this procedure must be rejected as

unsurgical—likewise the use of the red-hot iron to make the canal; but if after boring the canal it could be lined with skin the operation could be considered a good one, since, although there would still be a tendency to narrow from contraction of the subjacent tissue, the behavior of grafts placed on fresh wound surfaces gives the hope that the passage could be kept easily patulous by the use of sounds from time to time. In this category would fall the procedure suggested and practised with success by Van Hook

FIG. 1. FIG. 2.

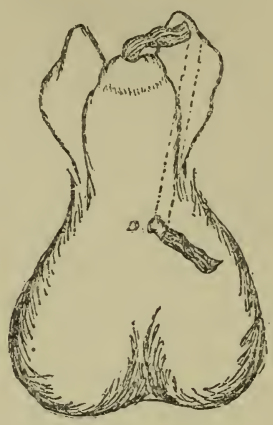


Weller Van Hook's operation.
The two figures indicate the formation of a preputial lining for a tunnel through the penis. (From *Annals of Surgery.*)

(*Annals of Surgery,* 1896, vol. xxiii., p. 378). In this operation he splits the prepuce, and making a tube (mucous surface in, raw surface out) around a piece of gauze carries it through a tunnel in the gland. This procedure is illustrated in the accompanying cuts (Figs. 1, 2, and 3). The method of Nové-Josserand (*Revue de Chirurgie,* 1898, No. 4) is also worthy of consideration. (See Figs. 4, 5, and 6.) He makes just in front of the hypospadiac opening a transverse incision 2 cm. long. He then undermines the skin with blunt instruments from this point to the situation of

the normal meatus. Having cut a graft from the thigh 4 cm. wide and having wrapped it around a No. 21 or 22 French sound (raw surface out, fixed in place by a ligature at each end and two sutures intermediate) he carries the whole through the tunnel already made.[1] This is left in eight to ten days and then a bougie (No. 19 F.) is passed daily for some days. About two months afterward the result could be considered definitely accomplished, the subjacent tissue having ceased to contract. Légueu thinks the fear of ultimate contraction of the canal ought to be definitely dis-

Fig. 3.



Indicates the site of the skin-flap when introduced from below upward.

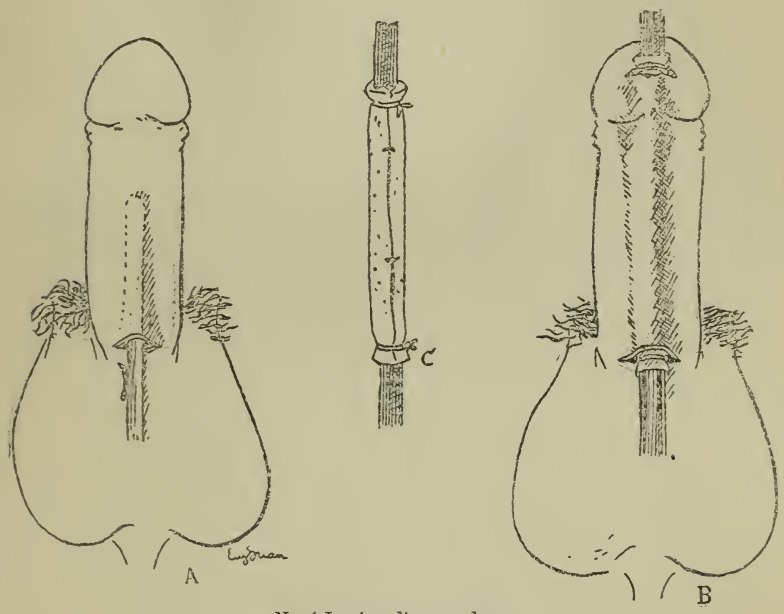
carded. Tuffier and Berger (Hildebrand's *Jahresbericht*, 1897, p. 849) have both done this operation with success. It is certainly an admirable procedure, and, like Van Hook's, has the great advantage over those of the type of Duplay's of permitting the whole canal to be made at one sitting.

The originator of this ingenious procedure lays stress upon certain points in the technique, and a failure to carry out these

[1] These Thiersch-Ollier grafts will find, I believe, useful application in the repair of urethral lesions in appropriate cases, and, indeed, in the surgery of all the orifices, especially the nares, where grafts may be wrapped about an Asch hollow intranasal split.

was the explanation of only partial success in his first case. In this case he made the tunnel too small and (as a consequence of this fault) began too soon the passage of sounds. The delicate epidermis was more or less torn off or damaged and the contraction of the canal was more difficult to prevent. Bearing this case in mind he made the canal in his second case large enough to lodge a No. 21 sound, and did not begin the passing of the sounds (soft) until the tenth

FIG. 4. FIG. 5. FIG. 6.

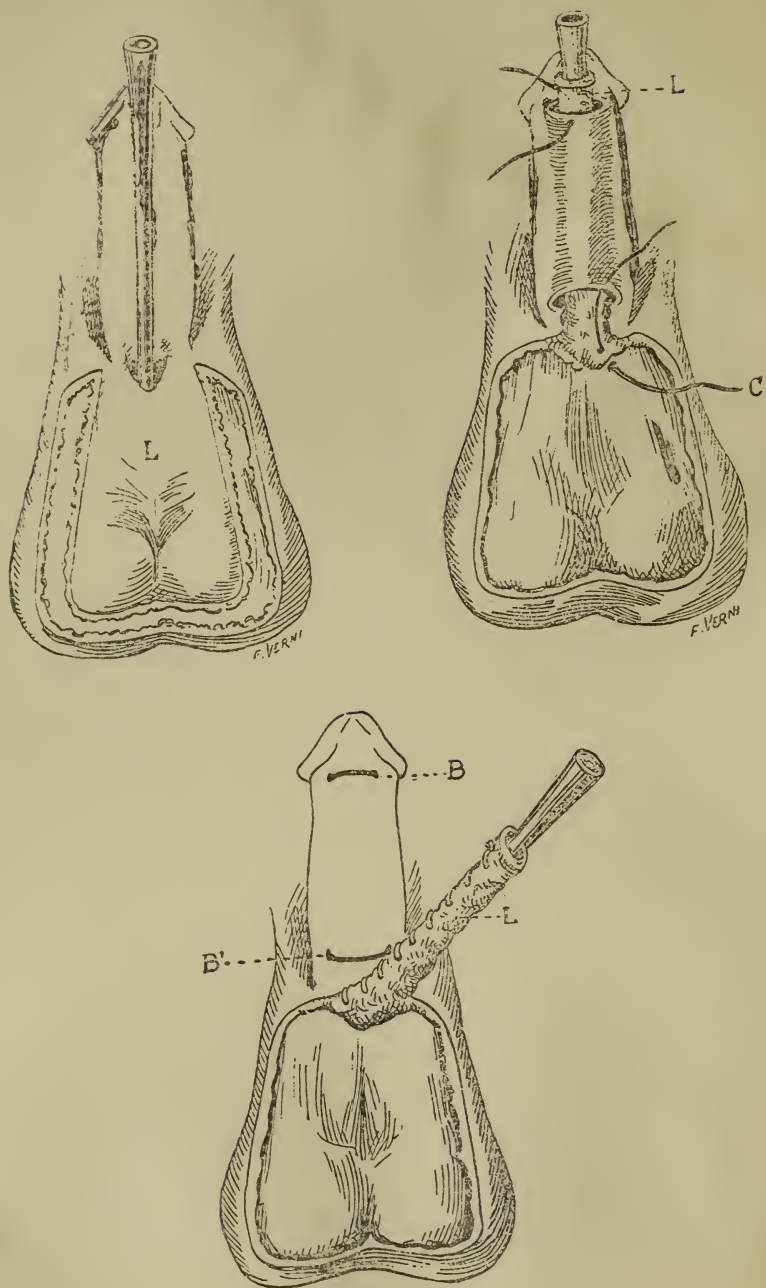


Nové-Josserand's procedure.

day and then began with a No. 19 F., so as not to damage the lining as in the other case. The result was prompt and complete, leaving nothing to be desired.

Rochet, of Lyons, has proposed a modification of this operation, which is made sufficiently clear by the accompanying cuts taken from the *Centralblatt für Chirurgie*, 1900, No. 34. I have not seen the original article in the *Gaz. heb. de Med. et de Chir.*, August, 1899, and do not know the details of the

Fig. 7.

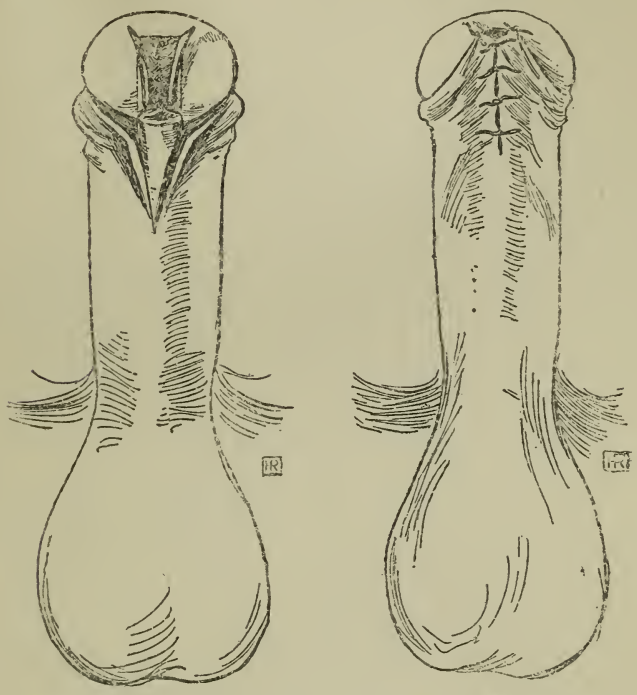


Rochet's operation.

The raw surface is to be closed by simple approximation.

technique, but it seems to differ from that of Nové-Josserand in that the new urethra consists entirely of scrotal skin, is attached by a pedicle to the scrotum, and is held about the sound by a *continuous* suture. This should give an excellent result, and with a perineal opening for bladder drainage there ought to be little difficulty in getting with some cer-

FIG. 8. FIG. 9.



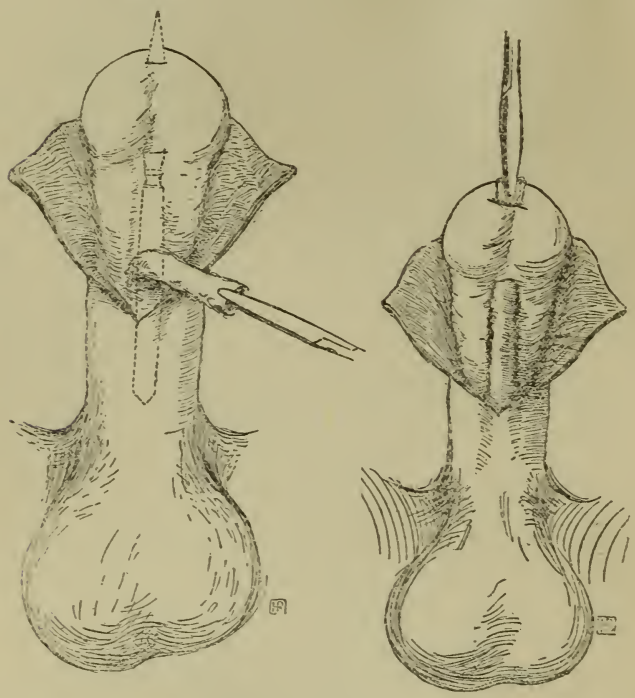
Illustrating Beck's original procedure. (From *New York Medical Journal.*)

tainty a definite result at one operation. A little management of the skin under the sound where it crosses the peno-scrotal junction will insure quick union all along the line of the skin tube without in any way interrupting the vascular connections between the scrotum and transplanted tube.

Beck's operation (*New York Medical Journal*, January 29, 1898) would properly come into this category; it differs

from those of Van Hook and Nové-Josserand in that it lines the new canal with the urethra itself. The operation is founded upon the extensibility of the urethra, which Beck has thoroughly demonstrated in the article above mentioned, and particularly in his last article, just received.[1] Valentine has recently (*New York Medical Record*, July 28, 1900)

Fig. 10. Fig. 11.



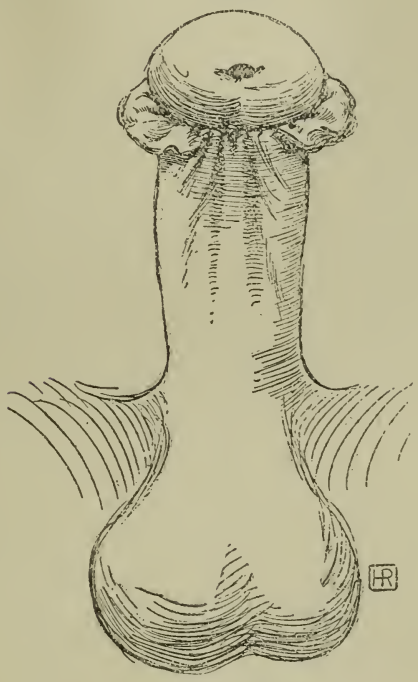
Tunnelling of glans by knife.

reported a case successfully treated by this method. He gives a very clear description of the operation, which he much extols. A careful study of the two descriptions of the operation by Beck and Valentine shows some material differences in technique. Thus, Beck after loosening up the

[1] See New York Medical Journal, December 8, 1900.

urethra from its bed stitches it to the freshened surfaces of the balanic groove, while Valentine tunnels out a canal under the furrow and pulls the urethra through, thus gaining additional support. For the honor of American surgery Valentine has well substantiated the claim of Beck of priority for this admirable procedure. Légueu mentions the names of Beck, Bardenheuer, and von Hacker as if they had proposed

Fig. 12.



Operation completed.

different techniques, but undoubtedly the credit belongs to Beck. The complete ignoring of Beck by some of his German imitators reminds one of the passage in Sir William Ferguson's lecture on hare-lip. Referring to some original views expressed by him, he said: "Nor need I do more than advert to the amiable and flattering device of a Continental admirer bringing them all out anew, a few years after,

as if they were his own." Bardenheuer has given credit to Beck as the originator of the operation. (See *Centralblatt*

FIG. 13.

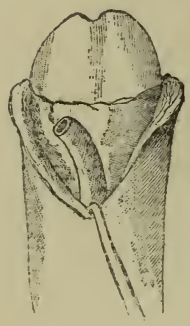
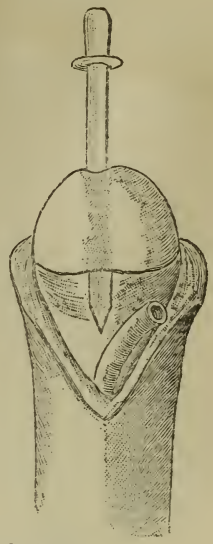


FIG. 14.



Bardenheuer's modification by trocar.

FIG. 15.

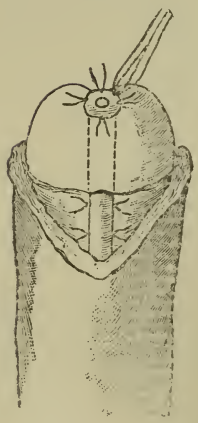
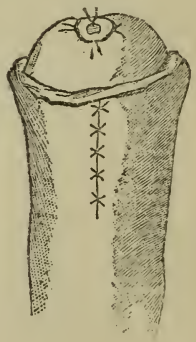


FIG. 16.

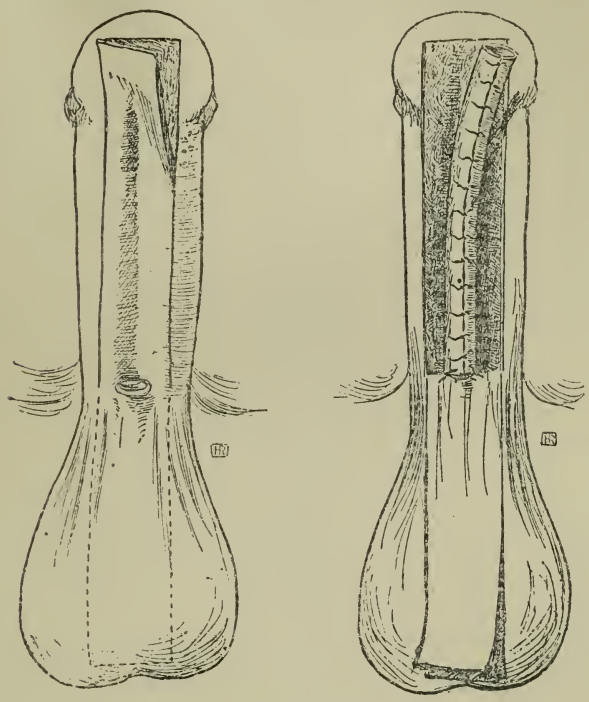


Bardenheuer's modification.

für Chir., 1898, No. 44, p. 1089.) He, however, proposes a modification which is practically the same as that carried

out by Valentine and described by him in the article referred to. Bardenheuer uses a trocar to do the tunnelling, whereas Valentine and Beck use a long, narrow knife, which seems to me the preferable procedure. Beck inferentially concedes to Bardenheuer priority for this modification in his article in the *Centralblatt für Chir.*, 1899, No. 1, although he there

FIG. 17. FIG. 18.



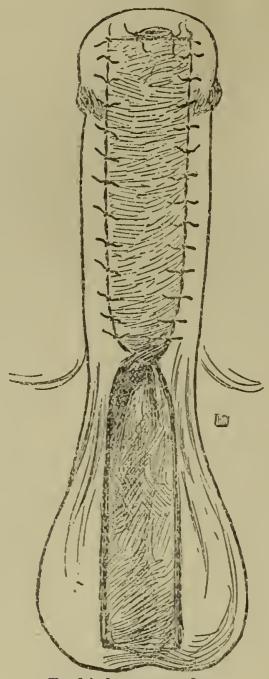
Beck's last procedure.

remarks that he (Beck) has added the modification of tunnelling with knife to his technique in operations subsequent to his first two publications. The cuts taken from Breuer's article illustrate this modification of the original Beck operation.[1] (See Figs. 13, 14, 15, and 16.)

[1] Von Hacker also claims the origination of this operation and fails to give Beck any credit at all (see Beiträge zur kl. Ch., Bd. xxii., Heft 1, August, 1898, and Centralbl.

I have done this operation myself recently with great satisfaction. One is surprised at the ease with which the urethra, when freely dissected up, can be drawn out. Depending as it does upon the extensibility of the urethra, the operation

Fig. 19.



Beck's last procedure.

is, of course, applicable only to cases of balanic hypospadias or, perhaps, to cases where the meatus is very near to the corona.

f. Chir., 1899, No. 1, p. 32), although Beck antedates him by months in both operation and publication. From a private letter just received from Dr. Beck as this goes to press I have reason to believe that Beck's claims were simply ignored by Von Hacker with a full knowledge of Beck's original publication, although as to the modification he seems to antedate both Beck and Bardenheuer. But the modification, while in certain cases an improvement on the original, is not essential, and we should honestly discountenance the course pursued by Von Hacker and credit the operation unreservedly to Beck. Dr. Beck has also a letter from Zuckerkandl (received the day he wrote me), wherein he regrets that on account of insufficient information he called the operation in his book the "Hacker-Beck," and promises to give Beck the entire credit in his lectures.

Beck in his last article, just received (*New York Medical Journal*, December 8, 1900), has extended the operation to

Fig. 20.

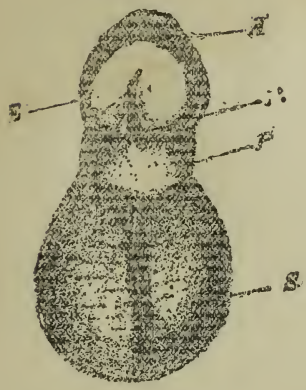


Fig. 21.

include even some degrees of penile hypospadias. This is clearly shown in the accompanying figures copied from his

Fig. 22.

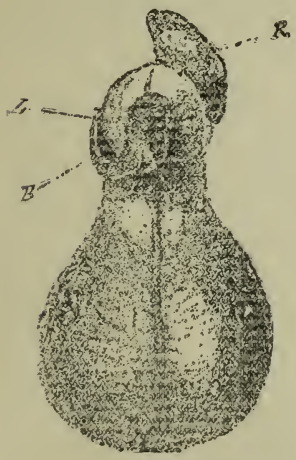
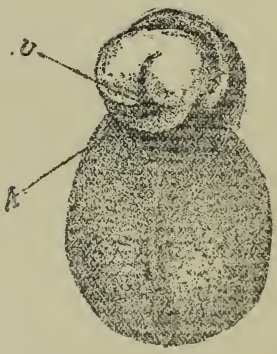


Fig. 23.



Kronacker's operation. (From *Deutsch. Zeitschr. f. Chir.*)

article. It will be observed that this procedure is very similar to that of Rochet, above described, though the mate-

rial is utilized in a different manner and the flaps are taken from the scrotum instead of from the penis, as is done by Beck, the scrotal skin being utilized by Beck to cover in the raw surface. (See Figs. 17, 18, and 19.)

The procedure of Kronacker also may be mentioned here. He utilizes the prepuce to make the glandular urethra (the cuts will sufficiently explain this). This would be objectionable by reason of the absence of erectile tissue in its construction and also owing to the thinness of the covering. (See Figs. 20, 21, 22, and 23.)

We come now to the second group of operations:

I. *Simple Approximation.* This was first done by Dieffenbach. Here also fall those of Krönlein and Duplay. The operations of Duplay are now classic and well known and need no detailed description here.[1]

II. *The Flap Operations.* The first flap operation (done for epispadias) was that of Nélaton, in 1852, and this operation, variously modified by John Wood, Dolbeau, and others, is still recommended even in some of the later works on operative surgery. While not applicable to hypospadias it no doubt suggested those of the type of the Link-Bidder-Landerer-Rosenberger operation. Rosenberger first described

[1] Duplay's first plan was to dissect up two quadrilateral flaps, turn them in over a sound of suitable size, unite them in the median line, and cover the raw surfaces by drawing in the skin from the sides of the penis after loosening them up by dissection. He soon found that this plan involved too much traction and the sutures often cut through. The plan he finally adopted, and that which now is the one usually carried out, is simply to make parallel incisions, one on each side of the penile groove, some millimetres apart; the internal lips of these incisions were dissected up the least bit so as to turn them toward but not completely over the sound; the external lips, on the contrary, were freely dissected up so as to pull the skin over the sound and cover it well in. The drawing in of the two external flaps drew in the two internal flaps and caused them nearly, but not quite, to touch in the middle line. The small space left between the edges of the internal flaps must, of course, heal by granulation and formation of cicatricial tissue, but Duplay says it is so little that it is almost linear and does not militate against the maintenance of an almost normal canal.

Routier has suggested (see Nové-Josserand's article in Revue de Chir., April, 1898) a plan which is really a recurrence to that discarded plan of Duplay's.

Before leaving this section I should remark that the results of a successful Duplay operation for hypospadias are excellent, for, as Légueu remarks, the urine is passed with force and in ample volume, the erection is rectilinear and permits normal coitus, and the spermatic fluid being ejected with force in the proper direction impregnation becomes again a possibility. If, however, after various unsuccessful attempts this operation fails, then resort must be had to one of the flap operations.

this operation at the Twentieth German Surgical Congress in 1891. This consisted in paring the edges of the penile furrow, extending these pared surfaces to the abdomen, where two parallel strips are removed corresponding to those on the penis. The penis is then carried up to the abdomen and the two surfaces are united by suture.

Later the penis is cut loose with a flap made by extending the lines parallel upon the abdomen of the length of the new urethra. This flap is severed and folded on to the raw surface of the penile flap. This principle, originally carried

FIG. 24.

FIG. 25.

Von Frisch's operation. (From *Universal Annual.*)

out for epispadias, was made the basis of an operation by Landerer and Bidder, apparently independently, for hypospadias. In the case of hypospadias, however, the flaps are taken from the scrotum, albeit in practically the same way as in Rosenberger's procedure.

The procedure of Link is somewhat different in its technique, although practically the same in result. He cuts away a narrow strip from each side of the hypospadiac furrow and turns up a sufficiently long rectangular flap from the scrotum and unites it to these freshened surfaces, skin surface inward. The outer raw surface of the flap is covered by

flaps of skin taken from the sides of the penis and united in the middle line.

John Wood operated by turning in two flaps from the sides of the urethral groove, stitching them there to form the urethra, and then covering the raw external surfaces with the split prepuce.

A. von Frisch (*Universal Annual*, 1893, E. 7) has suggested a very clever operation. Between the outer opposing edges of the glans penis he moves up and secures by suture a quadrilateral piece of prepuce which he has dissected up. The figures represent this fully. Kronacker's and Van Hook's use of the prepuce has already been described. In Thiersch's operation for epispadias the prepuce is skilfully employed to establish the continuity between the penile and balanic portions of the urethra.

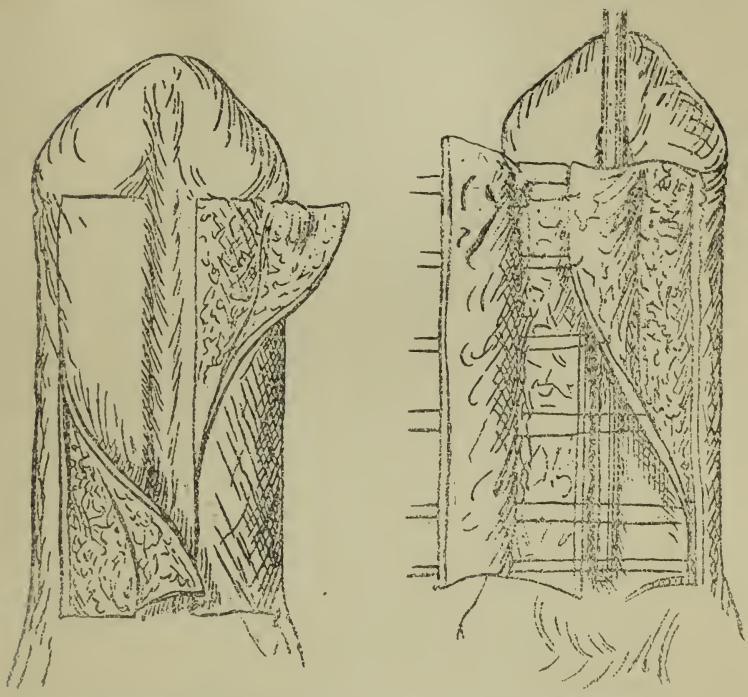
Regarding the various uses of the prepuce in this surgery, Treves remarks: "It may be pointed out that the integument of the prepuce and scrotum is not well adapted to form the tissue of a primary flap. It is not readily handled, and the lax subcutaneous layer renders œdema a troublesome complication. The prepuce may serve a useful purpose in assisting to close a small defect and in supplementing a more extensive operation, but it has not yielded satisfactory results when used to form the principal flap." These objections may apply with some force to the procedures of Kronacker, Nélaton, Rosenberger, Bidder, Landerer, and Link, but not to that of Van Hook nor to its use by Wood, whose operation was the special object of the criticism by Treves.

Laurent, of Brussels, corrected a case of deformity in a boy, aged nine and a half years, in the following manner (*Universal Annual*, 1896, E. 2):

Two oblique parallel cuts, 10 cm. apart, were made on the inner side of the right thigh, extending upward and outward and involving the abdominal region. This skin thus marked out was dissected up, being left attached at the two ends. The lateral borders of the urethral groove were then dissected free and a canal formed by uniting them in the middle line.

The penis was now slipped under the thigh flap in such a way as to bring the two raw surfaces together. When union had taken place the penis was cut loose with as much of the thigh flap as was required and the new skin thus gained used in further strengthening the urethral wall. In the Nélaton operation for epispadias, after the flap had been brought

FIG. 26. FIG. 27.

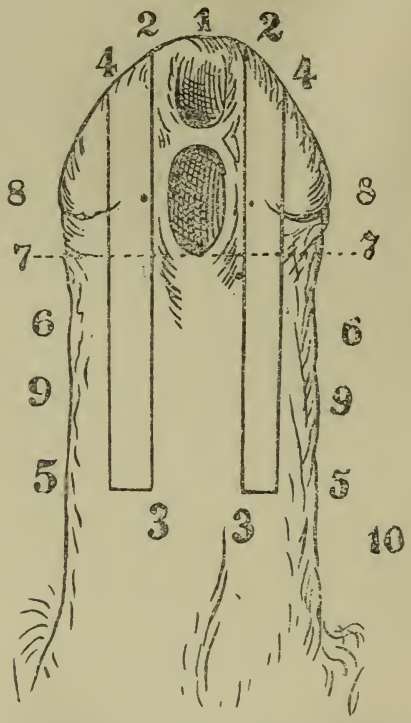


Anger's operation for hypospadias. (From Stephen Smith's *Operative Surgery.*) This is practically identical with Thiersch's operation for epispadias.

down from the abdomen with its epithelial surface in, the raw surface was covered in a manner similar to that of the last procedure by running the penis under a skin bridge dissected up from the scrotum. This operation is well depicted in White and Martin's *Genito-urinary Surgery* and in Treves' *Manual of Operative Surgery.*

The admirable operation of Thiersch, though originally intended for epispadias, may advantageously be employed for the treatment of hypospadias, with some slight modifications. Indeed, one of the first successful operations for hypospadias, done by Theophile Anger on a young man, aged

Fig. 28.



Gouley's operation. (From Stephen Smith's *Operative Surgery*.)
The central skin is pushed up until 3, 3 comes to 2, 2 and the denuded surfaces are brought into contact, the fold being at 7, 7.

sixteen years, in Paris in 1874, was, according to Duplay, absolutely identical with the procedure of Thiersch published in 1869. Figs. 26 and 27 show this operation of Anger.

Before closing this section of the plastic surgery of the urethra I will refer to the operations for establishing con-

tinuity between the various parts of the restored urethral canal and in the closure of fistula, whether from congenital or acquired causes.

When the opening is small, or if larger and the long dimension is in the axis of the urethra, the plan of Verneuil and Vollemier, of simple approximation with oblique denudation, without inclusion of the mucous membrane, may be success-

FIG. 29.

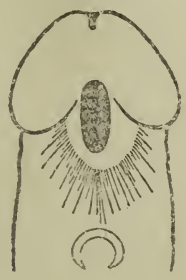


FIG. 30.

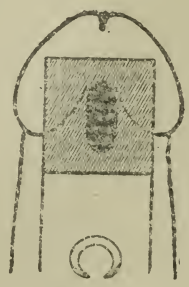


FIG. 31.

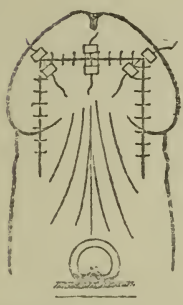
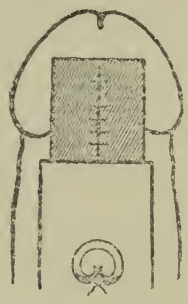


FIG. 32.



Loumeau's operation. (From Ninth French Surgical Congress *Transactions*, 1895.)

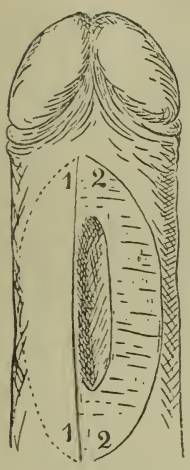
ful or the sliding flap method of Gouley may be tried. (See Fig. 28.) The method of Loumeau, described by him at the Ninth French Surgical Congress (see *Transactions*, 1895, p. 577), is a combination of urethrorrhaphy and urethroplasty, modelled after the suggestions of Delpech and Alliot. It consists in freshening a quadrilateral surface about the fistula as a centre and then prolonging backward incisions in the

lines of the lateral borders of this raw surface. The fistula is then closed by simple approximation, and the quadrilateral flap, attached behind, is pulled up until it exactly covers the raw surface, where it is held in place by three lines of sutures, one transverse and two longitudinal. Loumeau's case made a rapid and uninterrupted recovery. Figs. 29, 30, 31, and 32 give a good idea of the procedure. In many cases simple sliding of the edges toward each other, after making incisions on each side or in front and behind and some distance away from the fistulous opening, will answer admirably. Flaps may be taken from the scrotum, from the abdomen, from the thigh, or from the inguinal region and applied according to the Indian method, with the raw surface down; but in general the procedures of the French method (skin surface turned in) will give better results. The doubling methods, or methods by double flap from the penis and scrotum, as done by Artaud, Rigaud, and Sédillot, may sometimes be required and will occasionally give good results. The now classic procedures of Thiersch for closing the epispadiac opening between the old and the new-formed urethra is admirable and answers well, though not applicable, without modification, to hypospadias. In this case the flaps had best be taken from the scrotum, or as recommended by Thiersch for the formation of the penile urethra, or, better still, as practised by Szymanowski, a method identical in principle with that of Thiersch. Figs. 33, 34, and 35 illustrate this admirable operation, which, like Thiersch's procedure, is applicable to the closure of defects in the penile urethra, whether on the hypospadiac or on the epispadiac side of the penis. Weller Van Hook, in one of the cases reported by him, employed in the final closure of the hiatus between the new-made and the old portions of the urethra a flap taken from the scrotum covered by another furnished with a layer of the prepuce. Finally I may remark that, in this work on the penis, where after one stage of plastic work a raw surface is left exposed, this may be at once covered and the operation completed with excellent ultimate results by

Thiersch-Ollier grafts taken from arm or thigh. But in most cases, perhaps, as remarked by Duplay, defects of considerable extent may be closed by simple approximation of broadly freshened surfaces, especially if at the same time a perineal urethrotomy is done.

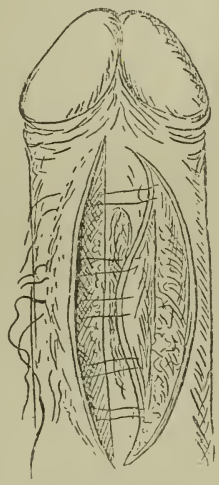
It was the great merit of Duplay and of Thiersch to have shown the tremendous advantage in this delicate plastic work of not attempting too much, but rather of doing it in stages with sufficient intervals to insure the stability of each step;

FIG. 33.



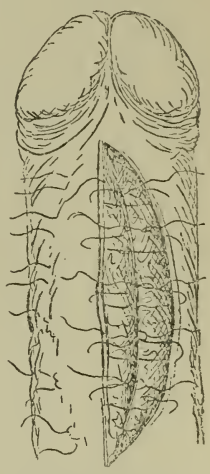
Dissection of two flaps.

FIG. 34.



Inversion of one flap. Szymanowski's operation.

FIG. 35.



Covering of first flap by the second.

and it was Thiersch who, following the practice first recommended by Louis, Viguerie, Dieffenbach, and Ségalas in the treatment of urinary fistula, first demonstrated the advisability of making a perineal opening for turning off the stream of urine from the field of operation in plastic work for both hypospadias and epispadias. One gets an idea of how great must have been the annoyance of the older surgeons from this cause by recalling the suggestion of Malgaigne to insert a canula suprapubically into the bladder and leave it in until healing could be accomplished.

On this point of perineal drainage of the bladder Duplay took issue with Thiersch, insisting that a tube passed through the hypospadiac opening during the first stages of the operation, and subsequently through the whole canal from the meatus to the bladder as a catheter *à demeure*, was quite sufficient and satisfactory; but, in spite of the conspicuous success of Duplay in this field of surgery, most surgeons nowadays will follow the suggestion of Thiersch and get rid of the annoyance of urine continually slipping alongside the catheter instead of through it. But it would seem that with the urine turned aside more of the work of plastic reformation ought to be done at one sitting and the total duration of the process of cure be materially abridged, though I venture to say that few surgeons will go so far as Tillaux in attempting to complete the operation at one sitting (*Leçons de Cliniques Chirurgicales*, Paris, p. 368). Indeed, in the case which he reports the urethra gave way behind and required at least one more operation. He would, perhaps, have gotten a better result had he, instead of depending upon the catheter introduced from meatus to bladder, have carried out the perineal drainage of Thiersch.

The Treatment of Epispadias. Baron (Dolbeau, *De l'epispadias*, Paris, 1861) says that one case of epispadias to 150 of hypospadias is about the relative frequency, but Marchal (Keyes) did not find one case in 60,000 conscripts, while Rennes (1831) says a military surgeon found ten cases of hypospadias among 3000 conscripts. It is certainly very rare (even if we include the slighter balanic forms), but Czerny, in his clinic in Heidelberg, treated six cases from 1878 to 1892 (*Annals of Surgery*, 1894, vol. xix., p. 111). During the same period fourteen cases of hypospadias were treated. Although this is an unusually rich clinic, drawing as it does, owing to the reputation of Czerny, from a very extended and populous area in Germany, still the disease is sufficiently frequent and so distressing when it does occur that it merits the most conscientious study of the surgeon.

In addition to the functional errors found in hypospadias

we have another in epispadias which is the most difficult of all to correct. I refer to incontinence of urine, which occurs in the greater number of cases of epispadias in some degree, while in hypospadias it is comparatively infrequent. The failure to restore the *besoin d'uriner* has rendered most of the operations suggested up to a very recent period unsatisfactory.

The operative procedures which have most engaged the attention of surgeons are those devised by Nélaton (1852), Rosenberger (1891), Thiersch (1869), and Duplay (1874 and 1880). The first, modified by Dolbeau, John Wood, and others, is still in some form practised by surgeons in certain cases, and standard works like Treves' *Manual*, Waring's *Operative Surgery*, and White and Martin's *Genito-urinary Surgery* still recommend it; but there can be but little doubt that both this and Rosenberger's are inferior in results to those of both Thiersch and Duplay, however ingenious they may be in technique. Thus, Walter Denison (*Annals of Surgery*, 1897, vol. xxv., p. 379), after an investigation of all the cases he could find of Rosenberger's operation, concluded that they gave no better results than previous procedures. Though the formation of the canal is quickly accomplished the incontinence is not relieved, and some better plan must be sought. The procedures of Thiersch and of Duplay are often followed by great improvement of the incontinence, but they, too, leave much to be desired. Perhaps the procedure of Boiffin (*Ninth French Congress of Surgery*, Paris, 1895, p. 576) conjoined with that of Thiersch or of Duplay might in some cases be of material assistance in overcoming the incontinence. He did a symphysiotomy after the manner suggested by Farabœuf, and then, having exposed the vesical urethra, wrinkled it up with sutures in such a way as to throw a fold into the urethra. This was found in one case to restore the power of control. Where the pubic bones have failed to unite, the suggestion of Trendelenburg to draw the bones together by suture might be worthy of trial. Could this restoration of incontinence in

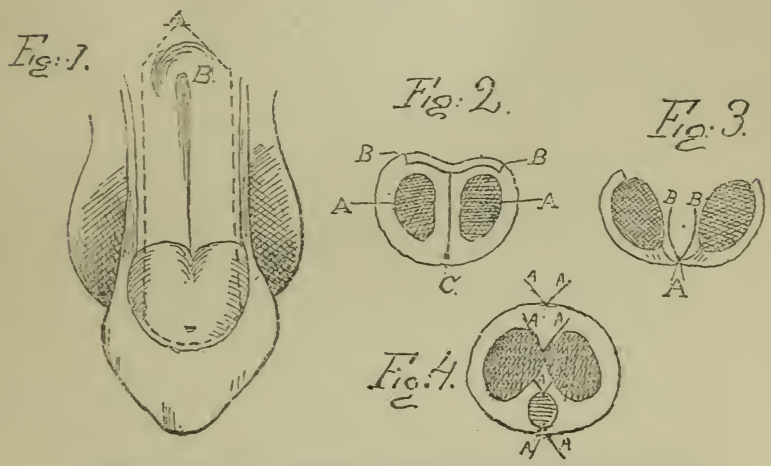
this or in any other way be brought about the operation of Thiersch or that of Duplay would accomplish all the desiderata in the most satisfactory manner. The operation of Thiersch, by double superimposed flaps, is the procedure preferred by most surgeons, but Légueu thinks Duplay's should be selected as the operation of choice,Thiersch's being reserved for special cases. Duplay takes advantage of the depth of the furrow between the cavernous bodies and aims to utilize as much as possible the mucous membrane lining its bottom and sides, while Thiersch simply draws the two skin flaps over the furrow to form the canal; but there seems no reason why in the Thiersch procedure the flaps may not be so manipulated as to accomplish the same thing as is claimed for that of Duplay. There is a suspicious odor of patriotism in the expressed preference. These operations are so well known and accessible that it would be a work of supererogation to depict or describe them here.

However admirable the results of these procedures may be —and they are, as seen in quite a number of successful cases —still the length of time required to obtain a final cure has been so great as to deter many of us from embarking upon this sea of operative difficulties. Thiersch worked one year and a half to cure one of his cases, and remarks that not less than three months should be consumed in the treatment of most cases. Pozzi got an excellent result by this method in three séances; but such cases as his are rare, and most of us would grow weary of waiting for the result, to say nothing of the patient. Any method which will give even as good results, but in much shorter time, would be welcomed by the surgeon. Such an operation, I believe, is that suggested by Cantwell, of Trenton, N. J., in 1895 (see *Annals of Surgery*, 1895, vol. xxii., p. 689).

Whether the cause of the condition be a fatal traumatism of the urethra by dammed-up urine, whereby the urethra is unroofed and displaced to the dorsum of the penis, as when a grain of corn pops on the stove, be correct or not (and it would seem from recent researches not to be), still the theory

was a good working one, for it led Cantwell to propose a very ingenious and effective technique, whereby a definite cure can be accomplished at one operation and in a very short time. His operation reverses the conditions by separating the cavernous bodies and carrying the urethra between them to its normal situation beneath the organ. This is easily done, for while in the normal urethra the cavernous bodies are so intimately blended that they seem actually to decussate, in the epispadiac they are so loosely united that they may be

FIG. 36.



Cantwell's operation or subpenile implantation of the epispadiac urethra. (From *Annals of Surgery.*)

separated at times by blunt dissection. (Englisch reports a complete separation of the corpora cavernosa.) The technique is well illustrated in the accompanying diagrams, Perineal drainage is first provided for by a urethrotomy and the insertion of a tube, preferably Watson's, which is shown in Tilden Brown's article in Morrow's *System*, vol. i., p. 615.

Duplay almost stumbled on the operation, as appears in the following quotation : " The cavernous bodies are separated from each other and only held together by a fibrous partition, often quite thin. By depressing this membrane above and

below the cavernous bodies can be seen obliquing toward each other, leaving a cleft capable of lodging a sound." He did not, however, go far enough, and to Cantwell belongs the honor of the establishment of the procedure on a firm surgical basis. (See Fig. 36.)

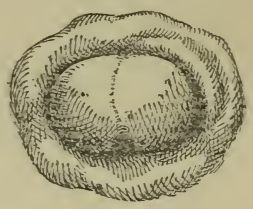
Herbert Page reports a successful case in a boy, aged ten years, operated on in 1898 by Cantwell's method. The case was a distressing one, with dribbling incontinence; when discharged, seven weeks after the operation, he was able to retain his urine all night and was able to attend school.

He preceded the operation proper by a perineal urethrotomy and the use of a Watson tube. Asepsis was maintained by keeping the boy during the whole healing process night and day in a boric-acid bath.

FIG. 37.

Before operation. Dr. Martin's case.

FIG. 38.



After Cantwell's operation. The urethra has not been brought entirely to end of glans.

(From pen sketch by Dr. Q. Kohnke.)

"It may be said," Page remarks, "that the result of the operation far exceeded our expectations; and while but small experience can be gained from one case only, I feel, nevertheless, that the record of it may be of use in calling the attention of surgeons to an operation of unquestionable value for the treatment and cure of a malformation so grievous and distressing as that of complete epispadias."

Through the kindness of my friend Dr. E. D. Martin I had recently the privilege of assisting him in the performance of this operation (done at my suggestion) upon a boy, aged five years, afflicted with complete epispadias, the abnormal meatus being, as in Page's case, just under the

pubic arch or slightly above it. Incontinence of urine was marked. The operation was done in October of this year. A pair of McArthur artery forceps was first introduced through the epispadiac meatus and made to bulge out the perineum. The point being cut out, a soft-rubber catheter was pushed into the bladder and retained by a suture. The operation proper was then begun by cutting out the urethral trough bodily by going well beneath it and lifting it freely from its place between the cavernous bodies. The dissection was carried well back to the infundibulum, the anterior wall of which was then caught with forceps and dissected up toward the pubic arch until the whole urethra, almost into the bladder, was well mobilized and could be freely pulled out until it could be extended, as in Beck's operation for hypospadias, nearly up to the normal situation of the meatus. It then looked very much like an open alligator's mouth. It was converted into a complete tube by suturing the sides of this to each other. This being done, the corpora cavernosa were separated by blunt dissection assisted by occasional snips with the scalpel. The glans was partly split so as to provide a place for lodging the new meatus. The new-made urethra was then carried through to the under side of the penis, and the meatus being sutured in place, the cavernous bodies were drawn in front of it and held together by a few sutures passed through them. The operation was completed by bringing the skin over the corpora in the median line. A very shapely organ was the result. The result after healing, which was somewhat delayed and marred by suppuration of the skin flap, while not all that could be desired, was most gratifying. The urethra retracted a little back from its position in the glans, leaving it practically as a post-balanic hypospadias, which I believe may be ultimately corrected by Beck's procedure of urethral extension. In another case I would pierce the glans with a trocar or narrow-bladed scalpel and pull the mobilized urethra through to its proper position in the glans, and to prevent the disturbing effects of sepsis I would keep the boy in the boric-acid bath, as suggested by

Page. When the boy was last seen healing was completed and the incontinence was so much improved that he could go regularly two hours or more without wetting his clothes, and we feel confident that as he gets older and brings to his assistance the natural feeling of pride the control will be almost normal. Indeed, with our experience in this one case, both Dr. Martin and myself can say without reservation that this operation of Cantwell's is by far the best yet devised for the treatment of epispadias. The possibilities of a combination of the suggestions of Cantwell, Weller Van Hook, Beck, and Nové-Josserand in the management of the many variations of this interesting malformation will broaden the operative field of both epispadias and hypospadias, and surgery will have cause to be grateful to the genius of American surgeons for giving us these notable additions to its resources.[1]

ADDENDUM.

Russell's Operation for Severe Perineoscrotal Hypospadias.

Since the publication of my article in the January (1901) issue of the *New Orleans Medical and Surgical Journal* I have read with much pleasure in the *British Medical Journal* of November 17, 1900, a paper by R. Hamilton Russell, of Melbourne, Australia, giving the details of an operation for severe hypospadias, devised by him, which seems to me well worth the consideration of the operative surgeon.

Fig. 39 shows the organ in its state of deformity. The urethra opens at *A*, in the perineum, and the sulcus, lined

[1] In a letter just received from Dr. Cantwell he reports that one of his patients "was married last May and seems contented. I (Dr. C.) am anxiously awaiting the result of the union, for that will be a crucial test of the operation."

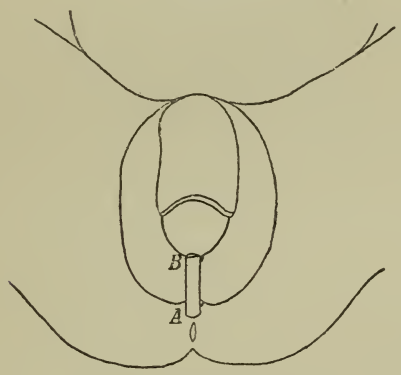
The doctor remarks: "It has often occurred to me that by following this method a good operation for bladder exstrophy could be devised, by carrying catheters through a perineal fistula up into the ureters, then dissecting off the bladder wall, bringing it over a small rubber balloon, pushing the whole into position, and uniting the abdominal wall in front of it."

with mucous membrane, extending from *A* to *B*, may be designated as the "perineal urethra." The penis is bound down to the scrotum, so that erection of the organ is impossible. There is no urethra in the penis, even the glans penis being imperforate. The objects of the operation are, of course, to straighten the penis and restore the urethral canal. These results Russell, it will be seen, accomplishes in two operations:

FIRST OPERATION.

Step I. A thread having been passed through the glans to serve as a tenaculum, an incision is made through the band which binds the organ to the scrotum. This incision may be carried at once around the penis back of the corona,

FIG. 39.



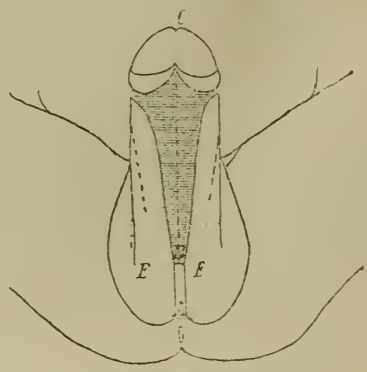
(From *British Medical Journal.*)

but not too close to it. With the tip of the left index-finger inserted into the gaping wound the resisting structures are felt, and one by one divided until they have been sufficiently cut to allow the penis to be drawn out straight. Whatever is in the way must be cut. This part of the operation is conveniently done with scissors. There will now be left a great length of raw surface exposed. The median sulcus between the corpora cavernosa may be deepened by cutting away the remains of the fibrous bands that have been divided

in the releasing operation. The shaded part in Fig. 40 shows the extent of raw surface exposed.

Step II. A channel is made through the glans by means of a tenotomy knife introduced with the cutting edge turned

FIG. 40.



(From *British Medical Journal.*)

FIG. 41.

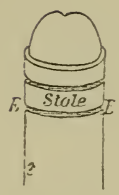
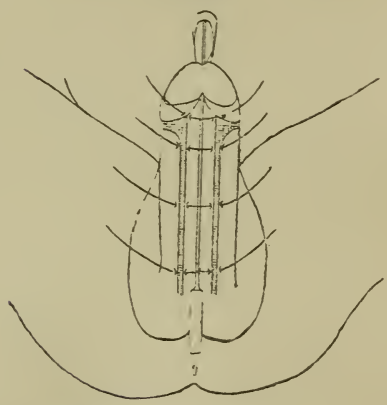


FIG. 42.



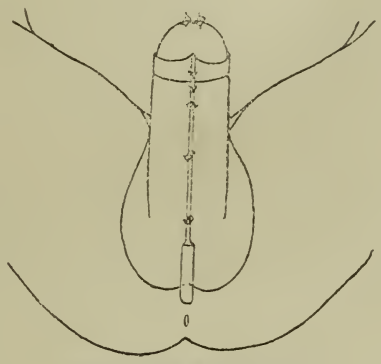
(From *British Medical Journal.*)

toward the dorsum and close to the under surface; the edge is carried freely toward the dorsum, thus making a cut in only one plane.

Step III. The incision indicated by the dotted lines *E E*, Figs. 40 and 41, starting near the end of the perineal urethra,

about one-third of an inch or less from the skin edge of the raw surface made by the straightening of the penis, is carried, always parallel to the skin margin, over the dorsum of the penis to the corresponding point on the opposite side of the end of the perineal urethra. A strip of prepuce will thus be marked out, very closely resembling a clergyman's stole (see Figs. 40 and 41). This loop of skin is now dissected loose from its connections everywhere except at its extremities, and is then slipped over the glans exactly as the clergyman removes his stole. A sinus forceps is passed through the perforated glans, the loop caught up and pulled through in

FIG. 43.



(From *British Medical Journal.*)

such a manner that the raw surfaces of the loop will be in contact with the raw surface of the slit in the glans. The loop is seen bulging in Fig. 42 on the sinus forceps. The redundant loop is cut away and a few stitches applied to hold the skin in place.

Step IV. Adjustment and suturing of the preputial flaps. On the *dorsum* of the penis the procedure resembles closely the suturing of circumcision; on the under surface of the organ, where the prepuce is made to cover over the two edges of the new urethra (Fig. 42), these edges should be included with the sutures, so that each suture should catch up and bring together four cutaneous edges—two of prepuce

and two of new urethra. Before tying these sutures inspection should be made of the junction of the perineal and the new urethras; a nipple-like projection at this point should be snipped off with the scissors. In putting these sutures through they should not take up the skin edge itself but the raw surface underneath and between the edges, so as, like fine Lembert sutures, to invert the edges of the new urethra. Fig. 42 should show the strips of skin on edge and not as depicted. The deeper edges of these strips should be well adjusted in the sulcus between the corpora cavernosa, but will not require any suturing. The result of the operation is shown in Fig. 43. No catheter or rod of any kind should be inserted into the canal. (What appears to be the handle of the staff in Figs. 42 and 43 is really intended to represent the perineal urethra yet remaining to be closed.)

SECOND OPERATION.

Suprapubic Cystotomy and Formation of the Perineal Urethra. One point is of paramount importance: the ridge where the urethral mucous membrane merges with the skin of the perineum must be accurately defined and the separation between the two be made just along this line. It may be done by cutting off with a delicate pair of scissors the crest of the ridge all the way around. The skin of the perineum just behind the urethra had best be incised a little so as to expose well the posterior boundary of the urethra. The perineal skin along the urethral groove should be dissected up a bit so as easily to bring the two edges together to form the canal. A dressing of collodion is then applied. Healing *per primam* will make it right to take the suprapubic drain out in a fortnight. The description of the operation here given is practically that of Russell, only such modifications being made as were deemed likely to make it clearer.

I do not see the necessity of a suprapubic drain in the operation. A Watson perineal tube inserted well back in the perineum would be much simpler and answer every pur-

pose. The perineal urethra could then be closed by the Duplay method. The whole procedure could be carried out satisfactorily in two stages. It is certainly an admirable operation and will save much time. It will be observed that Russell also utilizes the prepuce for lining the canal in the glans made by perforation as done in the operation of Weller Van Hook. The manner of using it in Russell's procedure is very ingenious, taking, as he does, two straight flaps of prepuce to line the two walls of a *linear* slit in the glans. It seems to have another advantage in that it disposes at once of the redundant prepuce, making the result strikingly like that of a very neatly done circumcision.

The plan of Bouisson would be, perhaps, advantageous: closing the gap made by straightening the penis and after healing was accomplished carrying out Beck's last procedure, with the management of the prepuce according to Russell's method.

DISCUSSION.

Dr. E. Denegre Martin, of New Orleans, La.—Mr. President: I wish to thank Dr. Parham for this most interesting and valuable paper. The operative treatment of epispadias and hypospadias has not been very satisfactory. Those of us who are doing plastic work can understand how essential it is to get all suggestions possible upon this subject. As a rule, the suggestions laid down in text-books are limited and unsatisfactory and can rarely be carried out in any one case. In the case referred to by Dr. Parham, operated upon by us two months ago, the child was five years of age and the deformity congenital. There was also a hernia upon the right side which had been operated upon in infancy. I believe the operation will entirely relieve the incontinence of urine. The penis is rudimentary. I carried out the suggestions made by Dr. Parham, with some modifications. The anterior flap was made from a portion of the skin and mucous membrane dissected from the pubis and extending back into the infundibulum. The remnants of the urethra were then dissected up from the dorsum of the glans penis and the two flaps sutured together laterally to form a new urethra. The

corpora were then divided and the new urethra placed in position and secured. The operation was practically completed in one sitting. Drainage was conducted through the perineum. This procedure I consider absolutely necessary to the success of the operation. We are more than satisfied with the result, as the case seemed almost hopeless before operation. I again wish to thank Dr. Parham for condensing the literature on this most important subject, as in this condensed form it must prove a most valuable work of reference.

OSTEOARTHRITIS OF THE SPINE.

By Michael Hoke, M.D.,
Atlanta, Ga.

I have recently had several cases of osteoarthritis of the vertebral column under observation. The only one of them of which I shall give a history has presented all the possible symptoms of the disease, from pain to paralysis, and all of the phases of the process, from the acute onset of the trouble, four and a half years ago, to the present time, convalescence being now quite well established. For this reason, and because during the period of his distress the condition has been mistaken by different observers for all of the diseases with which the osteoarthritic process in the spine is usually confused, and convinced that the characteristic bone changes confined to the vertebræ and spinal ligaments are quite common, as frequently to be seen in adult spines, as caries in children, though not so frequently recognized, it seemed to me that perhaps it might not be amiss to present the details of this one case, its suggestions as to the treatment of the disease, the result at the present time, along with some general remarks upon the clinical characteristics of the disease.

The disease is not new. Its characteristic changes have been found in skeletons in Egypt, dating back before the Christian era. Petrie found the changes in bones, the circumstances suggesting 1300 B. C. as the probable date; others were found in Egypt, the probable referable period being the second century before Christ; in Pompeii, by Chiaje; in the Roman sarcophagus at Smithfield, England, by Dr. Norman

Moore; in the catacombs of Paris, by Labert. Sutton reports the condition in the bones of oxen.

Nor is the disease rare, though from the scantiness of the literature only forty-five cases having been reported, nineteen of the disease of the spine alone, and twenty-five in which the other joints were involved, one would think it infrequent. This paucity of cases reported depends upon the fact that in only one orthopedic clinic in this country has there been much attention paid to chronic disease of the vertebræ other than tuberculosis, and to the seeming tendency to hold syphilis, chronic rheumatism, and rheumatic gout responsible for the patient's distress if there be no apparent vertebral disease. I have seen cases in woman with sensory disturbances in the back, pain, numbness, and tingling which were thought to be neurasthenia.

Until 1890, when Drs. Lane and Griffiths first suggested that the same process in the knees and hips, its essential characteristics there and elsewhere being a proliferation of bone around the edges of the epiphyseal cartilages and in the ligaments around the joints, was distinct from the process in rheumatoid disease, its history was linked with the effort of observers in England, Germany, and France to distinctly separate the manifestations of gout, rheumatism, and rheumatoid arthritis. Sydenham first, in 1683, from a clinical point of view, described rheumatoid arthritis as a modification of rheumatism. Rheumatoid arthritis was referred to in the writings of others between that time and 1800. In 1800 Landre Beauvais, in his thesis on "Goutte Asthenique Primitif," described the now recognized features of rheumatoid arthritis; he differentiated between rheumatoid arthritis and gout, but believed the rheumatoid process to be a part of rheumatism. He referred to the destruction of the joint cartilages, the chronicity of the disease and deformity of the joints. In 1804, Heberden supported Beauvais, but went further and differentiated between rheumatoid arthritis and rheumatism, but he, like other observers, for ninety years following his day, thought the cases with bony proliferation belonged to the true

rheumatoid disease, with atrophy of the bone structures. Heberden's nodes seen on the terminal phalanges of the fingers are typical of the osteoarthritic change.

The writings of others, notably Charcot, Trastour, Cornil and Ranvier, Colles, Senator, Virchow, Hutchinson, Spender, Chaffaurd, and Raymond, crystallized the interest in the rheumatoid joints, so that in 1897 the Berlin Congress for Internal Medicine decided that rheumatoid arthritis should be considered a disease *per se.*

Throughout all of this discussion, extending over nearly one hundred years, the cases of osteoarthritis was included in the rheumatoid class. No mention is made of this, but one sees it from a description of the cases. Not until 1883 was a single case of osteoarthritis limited to the vertebral column and its ligaments described; in that year Bradford reported three cases in young male adults between thirty and thirty-six years of age; he called it rheumatism of the spine. Marie reported one case in a man sixty years old who had had trouble with his back for ten years; the spine was ankylosed. Five cases were reported by Bithrew, in all of which there were symptoms of pressure upon the spinal nerve-roots. Goldthwait, in 1897, reported ten cases; established the identity of the process in the spine, the proliferative arthritis of which the nodes observed by Heberden on the fingers, and later by others in the head of the tibia and femur is the typical result and clearly separated this type of bone lesion from the atrophy of the epiphyseal cartilage and destruction of the heads of the bone characteristic of rheumatoid disease.

It is then a distinct entity, has its own definite pathological change, its own clinical characteristics, and must have, though it has not been determined, its own definite etiology.

The following is the history of the case: Dr. S. H., male, aged thirty years. One evening in March, 1896, he got wet. The next morning he awoke with severe pains in the lumbar region and in the thighs—he could hardly turn over. The usual measures for the relief of pain were applied; these gave some relief. The next day he was able to leave his bed and room, but not

without effort; the back was stiff and painful. The backache continued for several months—not excruciating, but sufficiently severe to keep him from going about much; during that time he was given tonics, massage, and the Paquelin cautery—there was no relief. In the winter of 1896 to 1897 he was in Baltimore as a student; his general health was poor, his back ached constantly; in the summer of 1897 his neck began to stiffen without appreciable cause; during this period the thermometer never registered higher than 99½° F. He spent the summer of 1897 in South Carolina practising medicine; after working for a few months, with increased pain, he returned to Baltimore for consultation and was advised to go to the hot springs; there was no bony deformity detected at this time; he remained at the hot springs, taking the baths and massage, but was little benefited; his condition was unchanged until the summer of 1898, when he began to suffer violent pains in the left side of the neck, extending on the left half of the scalp and down the arm; the numbness came on over the posterior half of the left side of the scalp, associated with weakening of the left arm, numbness and pain in the fingers, with partial atrophy of the hypothenar group of muscles of the left hand; the pains in the neck and head were excruciating, aggravated by the least motion. He went to Baltimore again and a diagnosis of neurasthenia was made; he was massaged, given electricity, tonics, laxatives, bowel irrigation; in August, 1899, he went to New York. I mention the name of the gentlemen whom he consulted there, not in a spirit of criticism, but simply to show the different views of the case; by this time there was distortion of the cervical vertebræ; this was palpable. Dr. Phelps saw him first. A diagnosis of tuberculosis was made. The disease was thought to be located in the third cervical vertebra. A corset with jury-mast was advised. Drs Whitman and Sayre made the diagnosis of rheumatoid arthritis; the plaster jacket and jury-mast was applied; the patient went home but returned six weeks later to put on an aluminium corset and jury-mast; Dr. Phelps was less inclined to say there was cervical caries, but put on the corset. From this doubt the patient was

not faithful in wearing the apparatus; it would have benefited him if he had done so. For two years preceding March, 1900, no weight had been gained or lost; the appetite was good, the pain was greatest when the bowels were irregular. The patella reflex was increased slightly on the right side; the hypothenar muscles regained their normal size. During the above period he had had liberal dosage with all antirheumatic remedies, iodides and mercury. From March last to August last the pains above described got worse; he could not sleep, because addicted to the chloral habit, twice taking almost a fatal dose.

He came under my observation last August; he was anæmic; hæmoglobin 60 per cent. The pain was as above, not constant, coming on in severe waves. Ordinarily his sleep was disturbed seven or eight times at night by sharp pains in the neck; at times he could not sleep at all; he was quite weak, nervous; hands, feet, and skin were cold and clammy. There was a little fermentative dyspepsia. The spine was straight and almost completely ankylosed from the seventh cervical to the sacrum. Some lateral mobility was still possible; the sum-total of motion between the vertebræ giving at the seventh cervical motion through a few degrees. The thorax was rigid; the head was rotated to the right and inclined forward, the neck could not be straightened; there was great spasm of all the muscles of the neck; much bony thickening throughout all of the cervical region, the spine there being one-half again thicker than normal; the hollow below the occiput was obliterated; the third cervical vertebra was particularly prominent behind, while its left transverse process felt as big as the end of the thumb; the neck was not completely ankylosed, but any attempt at motion was attended with a great deal of pain; the left row of transverse processes were displaced forward, the right backward. The pain, numbness, tingling, the scalp anæsthesia, and partial paralysis of the group of muscles mentioned were all due to this bony thickening, producing nerve pressure at the foramina for the exit of the cervical nerves. The lungs and heart were normal, the liver area seemed a little small, the right kidney was palpable and too freely movable;

the stomach contents showed a trace of peptones, no pro-peptones, no lactic acid; total acidity, 25; free HCl, 0.07; there was deficient absorption as shown by lavage; the stomach was put on a forced diet, food given every three hours day and night for a while, then only in the day; electricity was given to the stomach-wall and lavage twice a week; he was given tincture of nux vomica, ferratin, and carbonate of guaiacol; all other medicines were cut off; no chloral bromide or other depressing drugs allowed.

In one position only, in the recumbent posture, did the muscle spasm in the neck let up; there was comfort in this position; in that position there was no need of the muscles protecting the spine from painful motion, their rigidity being a crying demand for immobilization. For a while the pains were relieved by hot sand-bags which permitted the patient in the recumbent posture to nestle the neck into them into the non-spastic position.

In addition to these measures, after three weeks' observation the spine was immobilized in a plaster-of-Paris jacket with an extension up to the top of the head; the head strapped back to that extension; there was traction on the neck; this is not indicated; this jacket was applied with the patient on a hammock in the restful non-spastic position.

At present, but for the peculiar straddle-legged gait, as a result of the loss of the lumbar curve with the centre of gravity of the body anterior to the heads of the femurs and the slight forward inclination of the head, one would not think there was anything the matter with the patient. He has a good color, his hæmoglobin being 85 per cent.; only five pounds have been gained in weight, but the patient is active. He passes through the day with practically no pain; he usually goes through the night with no discomfort if he sleeps in the jacket; but about two or three nights in the week he wakes up about five o'clock in the morning with a dull neckache; several glasses of hot water relieved this, exactly why I do not know; there is now no spasms of the neck muscles; there is more motion in the cervical region on account of the lack of

muscle tension, and, I think, from a slight diminution in size of the bony outgrowth, since the acute process has quieted down. Of course, no effort was made or will be made to forcibly loosen the vertebral joints; such an effort would fail and excite the acute process again.

The disease consists in the deposition of bone in the spinal ligaments, nodular enlargement of the cartilage with subsequent ossification of these nodules. The process usually begins in the anterior ligament of the spine and extends up and down. Frequently it is only local, a small segment alone being involved, or, as in this case, it may extend from the sacrum to the skull. One segment may be involved on one side, then several vertebræ be skipped between that segment and another segment similarly involved on the other side.

Coincident with the deposition of bone the cartilaginous intervertebral disks are replaced by bone, so that the bodies of the vertebræ may be fused together in that way; the spine may be ankylcsed, too, by the continuity of the bony splints which are substituted for the ligaments.

If the process be more active on one side than the other a fixed lateral curvature results; the spine may be ankylosed in the straight position, the lateral curved position or with a rounded backward arch. Spasm of the back muscles in the early stage of the disease, without loss of the vertebral bodies, tends to straighten the lumbar and dorsal curve; hence, when there is much pain with resultant spasm, a stiff, straight back results, the muscle spasm holding it straight while the bony change fixes it so. If the disease be slowly progressive a rounded arch back results or is obtained.

Rarely are the spinous processes affected; the extension of the disease to the transverse processes is the most unfortunate thing that may happen to the patient, for it means deposition of the bones around the foramina and nerve-root pressure producing the disturbances of sensation, pain, and paralysis. Not all of the pain is due to nerve pressure and muscle spasm, for there seems to be a definite clinical relation between the condition of the digestive tract and the degree of suffering. Just

what this is is unknown. It suggests the intestinal tract as the laboratory for the manufacture of some toxic material productive of the disease. Absolutely nothing definite may be said of the etiology of the condition; it may follow a let down in health from any cause in an adult, young or old. No etiological relation can be found between the process and the poison of gout, syphilis, and rheumatism. Goldthwait, who has seen more of the disease than anyone here and abroad, describes it to the action of abnormal trophic impulses; this, of course, means nothing definite and is meant by him to suggest abnormal metabolism. Certainly, it is not an infection; no spinal cords have been examined to find a lesion there, nor do I believe any would be found. In the cases which have recently come under my care I have been greatly impressed with the clinical relation between the digestion and the disease, for the improvement in the condition when the stomach and bowels have been carefully looked after, the digestion and assimilation carefully studied and improved, the patient's gain has been marked. Iodides, bromides, salicylates, and other depressing drugs so long as they are administered lend the process a helping hand. Any anti-rheumatic treatment with a curtailment of the food-supply does harm, while, on the contrary, as soon as the diet is forced after an intelligent study of the individual food needs, the process begins to quiet down; the patient gains strength and suffers less. The process is one of bony excitation, one may say, for lack of knowledge and a descriptive term; any irritation causes increased production of bone. Given a spine which has been so affected the normal motion of that spine acts as a constant injury to the damaged vertebræ. It is thus necessary to absolutely immobilize the spine until the acute process quiets down. There are simply three things to take into consideration in the treatment of the disease: first, remember that it is not rheumatism, nor syphilis, nor gout, and that if the usual treatment for any one of these conditions is followed, it will do the patient incalculable harm; second, the spine must be given complete rest by immobilization with plaster-of-Paris jacket or apparatus; third, a thing to be

determined in each case, the condition of the stomach and intestines must be thoroughly examined into and any defect of digestion, however trivial, must be corrected.

Immobilization of the spine alone will not give a good result, neither will the most careful attention to the digestion alone give a good result, as the two things must go hand in hand.

DISCUSSION.

Dr. George S. Brown, of Birmingham, Ala.—Mr. President: I recently heard a very interesting paper by Dr. Hamberger, of the Johns Hopkins Hospital, on the Bence Jones reaction for the albumoses in the urine and its association with bony growths of the body, particularly of the trunk, and having in mind the importance of the early recognition of the disease under discussion as pointed out by Dr. Hoke, it has occurred to me to speculate on the possibility of some such early diagnostic sign being discovered whereby this very grave disease might be early recognized. I would suggest that the doctor make urinary tests with a view of finding out whether any condition of the urine exists that is peculiar to or pathognomonic of this tendency to deposit of bony material along the spine or elsewhere.

CARBOLIC ACID IN SURGERY.

By Seneca D. Powell, M.D.,
New York.

When carbolic acid was presented to the medical profession more than a quarter of a century ago its claim to be the best known germicide was based upon the fact that it was not only the first but the most efficient antiseptic. These facts were, however, overshadowed by the danger of its use, and it was, after a few years, almost completely set aside by the introduction of other so-called antiseptics. It has been my good fortune to discover a means of rendering its use in any strength comparatively free from danger, and to place before the profession a weapon against diseases heretofore almost incurable. After a series of experiments I found that alcohol possessed antidotal qualities, and that when used in full strength against the full strength of carbolic acid the acid lost its caustic effect. The possession of this knowledge enabled me to overcome the dangers attendant upon the use of carbolic acid in full strength, and I began to apply it to the uses of the surgeon.

In August, 1894, I was first absolutely convinced that I could control the action of carbolic acid under all circumstances. At that time I first used it in its full strength of 95 per cent. in an abscess cavity upon a patient suffering from suppurative appendicitis. Since then I have extended its use to all cases where we have to fight disease of microbic infection, and I am now prepared to assure you of its safety and unfailing reliability when brought properly into contact with the infected surfaces.

These observations are the results of the treatment of hundreds of cases which have come to my clinic at the Post-Graduate Hospital, and there is no field for its use, as laid down in the broad statement made a few months ago, where I have not carried the remedy and relieved the disease. I have done this absolutely and entirely alone, and alone am responsible; and it is upon this responsibility that I am urging you to lay aside old traditions, to believe that your fears are unfounded, and that carbolic acid is a safe remedy in safe hands.

When I first discovered the antidote and began to extend the uses of carbolic acid, and had a few cases to show that my theories were correct, I was foolish enough to believe that my method would be readily accepted and extend rapidly into general use. I was mistaken. I had forgotten that I had to deal with medical men and their prejudices, safeguards to the public, and that I must convince each one of you separately of the safety of the treatment before I could hope to have you accept my methods. I have found this no easy matter, even with the doctors side by side with me and my patient. Owing to this and other reasons I have not invaded the medical press, well knowing that my statements would be more than questioned. If the same delicacy of feeling had been shown by a few medical men who had personally availed themselves of courtesies extended to all at my clinics, the undivided honor would have been my own before the world. Some who have got their information about carbolic acid directly from me have gone into the medical press with a view to claiming priority in the application of this drug in certain cases.

I had been demonstrating the use of carbolic acid in my clinic at the Post-Graduate Hospital from 1894 up to January, 1899, and my views as to its application had not been accepted by any leading surgeon in New York, though all were convinced that alcohol was a perfect antidote. On January 7, 1899, Dr. A. M. Phelps, of New York, wrote a letter to the *New York Medical Journal*, a copy of which you will

find published January 14, 1899. In this letter Dr. Phelps gives me the credit not only of having discovered the antidote, but mentions its use in empyema. This letter was entirely unauthorized by me, and was without my knowledge or consent. In June of the same year he read a paper before the American Orthopedic Association describing a method of treating abscesses and diseases of the joints. In August, 1900, he presented a paper before the Thirteenth International Medical Congress in Paris, and I call your attention to the opening of Dr. Phelps' article:

"Last year and the year before I had the honor of presenting to the American Orthopedic Association a method of treating abscesses and diseases of the joints by a method somewhat unique. I also presented at that meeting a record of several cases of erysipelas treated in the City Hospital, and the charts of those cases showed that the plan of treatment cut short every case."[1]

Further on in the article I quote again:

"Up to two years ago it was extremely difficult to operate on suppurating hips and prevent suppuration, but with the advent of the use of pure carbolic acid, as I reported at the last meeting of this Congress, I have had no difficulty with such joints. The profession is indebted to Dr. Seneca D. Powell, of New York, for one of the most useful discoveries ever made in surgery. I allude to the antidotal effect of alcohol in carbolic acid. Dr. Powell has used carbolic acid for years in the treatment of infection and bone diseases in various parts of the body, and has recommended it for erysipelas and abscesses. I have tested it in the treatment of erysipelas, and find it as specific in that disease as quinine is a specific for malarial poisoning. Observing his good results in bone and other abscesses, I applied it to joint abscesses. There should be absolutely no difference between the treatment of abscesses of joints and that of abscesses occurring in any portion of bone or in the soft parts. My observation

[1] New York Medical Journal, September 1, 1900, p. 366.

during the past two years has demonstrated to me the accurateness of this statement."[1]

I call your attention to an error in the opening of his paper. He presented his papers in 1899, and not in 1898 and 1899. He speaks of his experience during a period of two years, when it should have been limited to one year. He quoted me as having "used carbolic acid for years in the treatment of infection and bone diseases," and as having "recommended it for erysipelas and abscesses," and he claims that upon observing my good results he "applied it to joint abscesses."

It is a well-known fact in the Post-Graduate Hospital that I was treating joint abscesses by this method for at least five years before I succeeded in prevailing upon Dr. Phelps to employ it in the treatment of his cases of joint abscess.

February 27, 1899, I presented this entire subject to the medical profession through a paper read at a stated meeting of the Medical Society of the County of New York. In that paper I covered the treatment of tuberculous diseases of the joints. I quote Dr. Phelps in the discussion.

"Dr. A. M. Phelps said that he had verified in his own practice almost every claim made by the reader of the paper except, perhaps, the treatment of erysipelas. Alcohol was certainly the most effective antidote for carbolic acid. In washing out tuberculous joints with this acid it had been found that there resulted a great deal of exudation, and as a result there was likely to be a limitation of motion. It was for this reason that at one time he had abandoned carbolic acid for bichloride of mercury. Finally, he had begun again its use after having seen the work of Dr. Powell. The plan followed had been to inject the joint first with pure carbolic acid, then with alcohol, and finally with water, after which the wound was closed. Those cases invariably went on to convalescence, except where there was bone disease beyond the reach of the acid."[2]

[1] New York Medical Journal, September 15, 1900, p. 441.
[2] Medical Record, March 11, 1899, pp. 372, 373.

I want to be as fair in my criticism of Dr. Phelps as it is possible to be, at the same time, I want the profession at large to understand that Dr. Phelps simply followed in my footsteps after a long period of persuasion on my part, and that, so far as I know, he has not added one single, solitary thing to my method of treatment. A fair-minded reading of his own words, which I have quoted, will justify me in calling your attention to this effort on the part of Dr. Phelps to gather to himself the credit of extending the use of carbolic acid into a new field.

I also resent the limitation which he places upon my work. I not only discovered that alcohol was an antidote to carbolic acid, but I discovered the fact that carbolic acid when applied according to my method was *the* remedy in the treatment of every single disease due to microbic origin, and this I consider the more important discovery. Possibly, there may be some within the sound of my voice who have heard me several times during these years fight for carbolic acid when I have been ridiculed and derided and attempts have been made to laugh me down.

I have discovered the antidote, and I have, alone and unaided, demonstrated its uses in the fields pointed out by me. I have covered the ground entirely alone and unaided, and I present to you the results of my own work, and I am ready and do assume the entire responsibility. It would be a very simple matter for me to demonstrate the fact that alcohol is an antidote for carbolic acid by washing my hands in pure carbolic acid before you, as I have done for others many times, or even taking a teaspoonful of acid in my mouth, as I have done occasionally, but I shall ask you to believe me without such ocular demonstration.

Given three facts—first, that all infective diseases are dependent upon a pathogenic germ; second, that 95 per cent. carbolic acid is an infallible germicide; and, third, that 95 per cent. alcohol is a perfect antidote for carbolic acid—we have three propositions which, followed to their natural conclusions, lead us to the unassailable position which I have

assumed before you, that with carbolic acid properly used we have an absolutely safe and *sure* remedy for all diseases caused by a microbe.

The medical profession have been led to believe that carbolic acid, even in its weakest solutions, is a very dangerous remedy, and frequent statements are observed in the medical press claiming that gangrene will follow its use, even when used in a very weak solution. We are warned against the use of weak solutions because they are so easily absorbed and that their use is followed by gangrene; yet in the next breath we are told that a 2 per cent. solution is almost inert and is not a germicidal solution. I have seen but one case of carbolic poisoning from absorption by the use of wet dressings, and no harm came from this case. It was a child two years of age that was burned over almost the entire body and one limb. This surface was covered with gauze and kept wet with a 2 per cent. solution of carbolic acid. After forty-eight hours the urine was smoky. The solution was reduced to one-half of 1 per cent., the smoky urine disappeared and the patient made an excellent recovery. Other than this I have no knowledge of the danger of using carbolic acid in weak solutions. I have seen many cases of so-called carbolic poisoning, and in every instance I found the diagnosis wrong, and the continued use of the remedy was followed by no bad result.

I do not wish to be misunderstood in these instances as possessing knowledge greater than others, but I do know that where we are possessed with doubts and fears, apparently backed up by old-time prejudices, we are more apt to see evidences of carbolic poisoning in patients using the drug than we would be to suspect trouble from other reasons.

I have a record of seven cases of internal poisoning by carbolic acid, either from intent or otherwise, whose lives have been saved by administering about twice the amount of alcohol as carbolic acid. It is also a well-established fact that when carbolic acid is mixed with whiskey or brandy it will not kill. Some few of these facts have leaked out, and the daily

press wrote them up in such a way as to lessen the importance of this knowledge. Had such a discovery been made abroad it would have been common knowledge in every household by this time. I am clinging to the hope that this may yet be verified and that this information may be published broadcast throughout the world.

I still feel that this information should be disseminated through the means of the public press, and I beg that even the most skeptical of you will see to it that the people are made aware of these facts.

And now as to its use in surgery.

In my experience I have found a very great difference in the results obtained from different brands (if I may so use the term) of carbolic acid. I mean products from different manufacturers. The carbolic acid which I have found the most satisfactory has been that made by Calvert, of England, and known as Calvert's No. 1. With this acid there is no question as to the terminal result when properly applied. Its high price, as compared to the acids in the market, stands in the way of its general use in hospitals; but, if you will bear in mind, a pint of carbolic acid goes a long way, and it more than repays the extra cost, in my judgment.

Let us take the simplest of all—ivy poisoning.

Many of you have opportunities of demonstrating its efficacy in this disease. Make a 5 per cent. solution of carbolic acid, and wet a gauze compress with it and place it over the surface inflamed for a period of from ten minutes to half an hour, the time depending upon the age of the patient and the sensitiveness of the skin; then substitute gauze wet with a 2 per cent. solution, and continue its use until all traces of the disease have disappeared. You will find many patients who will stand a solution stronger than this. A drachm of carbolic acid to an ounce of water, which, when shaken up thoroughly, resembles milk, and if applied upon the surface and allowed to remain until the surface whitens, will be very efficacious. While a 5 per cent. solution may smart quite perceptibly in some instances, it will not blister or destroy the

surface of the most sensitive. Indeed, you will find that many patients will not show any difference between this and the 2 per cent. solution. I have frequently seen a patient cured in twenty-four hours when the disease was so extensive that the face was swollen out of all recognition and the eyes closed from the swollen lids.

In all cases where the ivy poisoning has appeared upon other surfaces of the body than the face I use a drachm to the ounce. When the surface is whitened, which will be in from five to fifteen minutes, then further action of the acid can be checked by the use of alcohol.

Specific urethritis will yield to one treatment in the majority of cases. In the female I use a drachm to the ounce, having thoroughly cleansed the vagina, following the use of the acid with alcohol after the surface is well whitened and puckered, following up its treatment by syringing with a warm 2 per cent. solution.

In the male a deep urethral injection is made of a 5 per cent. solution, and being followed in a leisurely way with two or three syringefuls of warm or hot water. Sometimes this treatment may be followed by a sensation of swelling along the urethra, and I have seen a slight discharge following its use, but I have never seen an ill effect, and have no reason ever to have regretted following this method.

In cases where the infection has been of long standing I have found it necessary to repeat the injection a few times; but this is of rare occurrence.

Erysipelas is also amenable to treatment with this drug, and here we use 95 per cent. carbolic acid, and it will be probably the most severe test that the surgeon will be called upon to make—I mean from the surgeon's stand-point. He must always follow directions closely, and damage may result from a failure to observe this.

I manage it in this way: Placing the patient flat on the back, and with the head placed back so as to present as nearly as possible a level surface of the face, I apply a 95 per cent. solution of carbolic acid with a well-rolled mop

of absorbent cotton. I watch the surface carefully, and as soon as it turns white I swab it off with alcohol. Your materials should be at hand and readily available, and you should depend upon your judgment as to when the alcohol should be applied, and not upon the complaints of the patient. I paint the surface about the eye with pure acid, holding gauze pledgets in between the closed lids, to prevent the acid entering the eye. Be very careful not to allow the alcohol to be brought into contact with the surface before the acid is applied, as it will prevent the acid from acting on that surface. After this, not only the entire face, but all of the surface involved by the disease can be treated in this way. You will have to use a larger mop of cotton, so as to go over the surface rapidly and completely. Then in some cases it will act so quickly as to compel you to do it in sections, not only covering the diseased surface, but going over the line one inch or more; especially does this apply to the treatment of erysipelas in other locations. I have applied carbolic acid in this way to the entire body below the nipple line and above the knees to a patient, a young girl, about twenty years of age, reducing the temperature from 106° to normal in four hours. The action of the acid in these cases is uniformly promptly successful in its results.

We are no longer afraid of erysipelas in our general wards in the Post-Graduate Hospital, and we retain these cases in adjoining beds to other surgical cases. My method is in use in the erysipelas wards in Bellevue and the City Hospital, and I have it directly from those in authority that it has yet to record a failure.

Lymphangitis arising from an infected wound of the hand or foot and extending up into the limb, marked by a well-defined area of redness, swelling, and pain, accompanied by high temperature, delirium, and more or less enlargement of the glands along the infection and in the axilla and Scarpa's angle, yields at once to this drug when applied in its full strength at the site of the infection and along the line of the lymphatics.

I do not apply the alcohol into the infected wound after having used 95 per cent. carbolic acid in these instances, but do use it on the outside surfaces just as I do in cases of erysipelas. In these cases I usually envelop the limb in gauze of several thicknesses and keep it wet with a 2 per cent. solution of carbolic acid. The microbe in these cases, as a rule, and also in cellulitis following infection, is a streptococcus. It is more active and harder to kill than any other germ we have to fight.

Infections coming from abscesses in or about the intestinal tract are peculiarly active and injurious, and the entrance of germs from this source into abrasions or susceptible surfaces has been the cause of many deaths among surgeons.

Every surgeon who has experienced the annoyance and suffered from the clinging smell which hangs to his hands for days after having opened one of these abscesses will be pleased to know that the washing of the hands in a solution of one drachm to the ounce and rinsing them in alcohol will remove this odor and make his hands completely aseptic. It is particularly important to the active surgeon who may be called upon to make an autopsy in death from septic peritonitis several hours after rigor mortis has taken place, and then to operate upon an abdomen entirely free from any infection.

If my experience were limited to a few cases I might hesitate, but I can invite you to witness this method in what I am assured by surgeons capable of judging is the largest surgical clinic in this country. I am frequently called upon to treat not less than fifty cases of infected wounds at one of my daily clinics.

Abscesses, wherever located, can be treated speedily by the injection of or swabbing freely with pure carbolic acid. The size of the abscess or the amount of surface covered is not a factor. Only thorough drainage and complete removal of the pyogenic membrane need be considered.

It is now a well-established fact that all suppuration is due to a germ; that there is no such thing as laudable pus, and

that a wound heals without any secretion other than a slight oozing of healthy serum when kept free from infection; and it is also a fact that when you have a purulent discharge, even though your wound be a healing one, you also have an infected wound.

There are certain rules which pertain to all conditions. They are thorough application of the drug and thorough drainage. Thorough drainage must be obtained without such extensive incisions as we have been taught to be necessary. Ordinarily an opening large enough to evacuate the pus completely is sufficient, but where you have a thickened pyogenic membrane, and curettage is essential for a rapid recovery, then the drain opening should be made large enough for the operator to penetrate the entire cavity. For instance, in mammary abscess, an opening large enough to evacuate the abscess completely would not extend over half an inch, and I have found that this opening is quite sufficient; but where you have an abscess of long standing, where a well-developed pyogenic membrane is formed, a larger opening must be made.

Abscesses in or about the joints, with fistulous tracts leading away which must be thoroughly curetted, must of necessity demand a larger opening. Abscesses in bone require special treatment. Necrosis results from the presence of germs, and the removal of the necrosed tissue and free drainage does not, as a rule, answer the purpose. Especially is this so in long bones before the formation of a sequestrum. You must kill the germ which has caused the disease, and you will not always find him on the surface, waiting to be washed or wiped out, but buried deep in the tissue, attending strictly to business—the destruction of tissue.

I have convinced the most skeptical that carbolic acid extends far beyond the area of application in its influence, and to meet this requirement in the above cases I pour the bone cavity full of a 95 per cent. solution of carbolic acid and allow it to remain at least ten minutes.

Tubercular disease yields to carbolic acid when thoroughly and promptly applied, and I have one patient, living and

well, upon whom I operated in 1895 for tubercular disease involving the apices of both lungs. I removed part of the second and third ribs on both sides and applied the drug directly into the lung tissue, as it should be done, down to the diseased surface. After several applications healthy granulation took place, and that man is living and well to-day.

I have also succeeded in many instances in bringing about a cure in tubercular disease where an operation was not to be considered; in fact, an operation was impossible. The treatment is conducted by placing the patient upon carbolic acid internally in the shape of pill, capsule, or solution, beginning with small doses and gradually running it up until we have an effective result. By watching the urine you will receive prompt evidence of its poisonous effects. There will be no difficulty in increasing the dose to 10 grains three times a day in ordinary cases. I am also in the habit of injecting a solution of carbolic acid into and around the diseased tissue.

Brain abscesses are also amenable to this treatment, and a 5 per cent. solution will be found strong enough to remove the infection after thorough drainage.

Abscesses of the breast yield very readily to this treatment, and the solution of one drachm to the ounce is the proper one to use if the pocket has been emptied and irrigated. In many instances I have allowed the child to continue nursing from this diseased breast. I believe it to be a mistake to put on any compress which will interfere with proper drainage. My custom is to hold the breast up in a sling, and in that way to secure good drainage.

Pelvic abscesses, abscesses of the liver, perityphlitic abscesses—all are treated in a similar manner.

An infected uterus following childbirth can be treated as a large abscess cavity. I swab out the entire uterine surface with a solution of a drachm to the ounce of carbolic acid and pack the cavity well with a gauze bandage rinsed out of a 5 per cent. solution. If the temperature of the patient does not fall immediately after this treatment you can rest assured that there are points of infection which you have not reached.

Palmar abscesses, either those resulting from infections directly into the palm of the hand or from so-called felons, which are nothing but infections, are peculiarly adapted to treatment by my method. Make a small opening at the site of the original infection and swab out all the accessible cavity with 95 per cent. carbolic acid, and where there is a sinus leading up into the palm of the hand or up underneath the annular ligament above the wrist, pass along a long silver-nozzle syringe, probe pointed, and inject into that sinus a drachm to the ounce solution of carbolic acid. The limb is then enveloped in gauze and kept wet with a 2 per cent. solution.

In mastoid diseases the results are more than satisfactory. First secure thorough drainage and then be generous with the amount of pure carbolic acid poured in, and use gauze drain. I called Dr. D. B. St. John Roosa's attention to this method about three years ago, and he assures me that it is far in advance of the old method of handling these cases.

Ischiorectal abscesses require a special word. In my practice I have found no occasion in recent years to cut through sphincters to obtain a cure. I make a small opening, half an inch usually, parallel with the outer fibres of the external sphincter muscle, and then use the curette if the abscess is of long standing; then swab it out with a 95 per cent. solution of the acid carefully and thoroughly. You can also use this long-nozzle syringe spoken of before, and follow out any sinus which may lead from the abscess cavity. Into that you can inject pure carbolic acid. If the abscess is of recent date a drachm to the ounce is sufficiently strong; but if it is of long standing, and a pyogenic membrane is formed, you must depend upon the curette and 95 per cent. acid thoroughly applied. I do not use alcohol under these conditions. Also recollect that the alcohol is used only where you want to limit the action of the acid, and you do not want to limit the action of the acid where you have a well-formed pyogenic membrane or where you have an active infective process going on. Destroy the pyogenic membrane with the curette and the carbolic acid together if you can, and with the acid alone

if you must, for you know it is not always safe to use a curette in cellular tissue. Recollect that wherever too much force is used a new abrasion is made, and that is a point for reinfection. This applies particularly to the treatment of ischiorectal abscesses and empyemas.

A word or two about empyema: Aspiration is very frequently satisfactory, and is followed by recovery if it is made at a time when the pleural cavity is full of a perfectly sterile serum; but if you have made one aspiration and removed a sufficient quantity of fluid, and the condition recurs, I would advise you not to aspirate a second time, because experience has shown me that one is much more liable to infect the pleural cavity by aspiration than by making a free opening. If you have pus you are not justified in aspirating any cavity if you aspirate with any other view than that of confirming your diagnosis. If you aspirate and find pus, then operate. If the case is recent, and the pus is very thin and there does not seem to be abundant fibrin, a small opening will answer. Cutting down and resecting three-quarters of one rib will be ample. It does not make much difference what instrument you take to resect the rib. In children it does not take much strength, but in adults it is different. Take out the piece of bone, and then with a scalpel dissect quickly through all the muscular tissue until you strike the pleural cavity, taking precaution not to cut any bloodvessels. Great care must be taken with the anæsthetic, as it is much more dangerous to give an anæsthetic to a patient with a distended pleural cavity than to any other patient you are called upon to treat. It is not safe to administer an anæsthetic unless the patient is over on the diseased side, so that the free lung can expand easily and maintain respiration. You have then simply to accomplish drainage. There is a streptococcus, and you must remove that or you are not assisting nature as much as you can. The only way to do it is to irrigate the pleural cavity with a strong solution of carbolic acid. I have done it not once or twice, but hundreds of times, and am perfectly satisfied with the results. I introduce a solution of one drachm to the ounce,

though this is not a solution, but rather an emulsion, the carbolic acid being held in suspension. When it is shaken up thoroughly it is milky white. Wash out the pleural cavity with a 2 per cent. solution; after it is perfectly clean pour in a solution of a drachm to an ounce until the pus-pocket is filled, then empty it out and irrigate with a 2 per cent. solution. Put in drainage, but do not put it in far enough to interfere with the expansion of the lungs. The simplest drain, the one which I advise, has two little pieces of curved metal, very similar to the pieces of metal used to pull open the buccal cavity. Put a piece of tape in the hole in each one to fasten it on with. Insert into the aperture a pledget of gauze wet with carbolic-acid solution, so as to start up capillary attraction, and in this way get the secretion out of the cavity; then use your compresses.

If the pocket has lasted a long time this treatment will not be effective. A pus-pocket of long standing has a thick pyogenic membrane, and a solution of carbolic acid of one drachm to the ounce will not be of any effect. You must make a larger opening and take out three, four, or five inches of one or more ribs. Do not make the mistake of making a square opening. Take out a lengthwise piece of the rib and get a long opening. You can then curette the pleural cavity, if you have confidence enough to curette. It can be done without any harm. Then take a piece of gauze and swab out the entire cavity while the water is running in, swabbing off not only the thoracic wall, but the wall of the lung as well. This breaks down the fibrin which has accumulated and become adherent and brings the solution in contact with the walls. Then pour in your carbolic-acid solution. Use a pitcher or a fountain syringe, and let it run in until the cavity is full. I have let it remain in anywhere from three to ten minutes, according to the condition, age of the patient, etc. Then turn the patient over and let it run out. If you are afraid of carbolic-acid poisoning, run in some alcohol. Drain out thoroughly and put in your drainage. You cannot always cure these patients in one operation. You cannot

tell how much the lung is going to expand as soon as the fluid is removed from the pleural cavity. If it has not been crowded up for a long time it will fill up the cavity very rapidly. Then the case is very simple, because you do not have to take out enough of the rib to throw the wall in, and in this way assist in filling up the cavity. If you have a partially solidified lung, and it goes back to only half of its original size, then you must bring the chest wall to the lung. General Lee was going along a road one day and saw a soldier up a tree, eating persimmons. The general asked him what he was doing that for, etc. The soldier replied that as the rations were not large enough to fit the size of his stomach, he was trying to draw his stomach down to fit the size of the rations! So it is here. If we cannot bring the lung to the chest wall we must take the chest wall to the lung, even if we produce curvature of the spine. All of these cases can be cured, but not without deformity.

Cases from Notes of Clinics.

CASE I. *Necrosis of Femur.*—This case I had before you in the operating-room. The patient is fifty years of age, and gives the following history: When fifteen years of age a horse fell on the man's right knee. Several weeks later the knee became very much swollen, painful, and stiff. About five months later an abscess formed and opened on the thigh, about six inches above the knee on the outer and posterior aspect of the femur. From this opening several pieces of dead bone were discharged, when the pain and swelling disappeared. This discharge continued for several years, and then ceased for a time. There were periods when there were no symptoms whatever; then again the limb would become swollen and painful and break down and discharge. These periods were variable, and continued up to eighteen years ago. Since that time the discharge has been continuous. He was put under an anæsthetic January 26th. After the usual preparation an incision about three inches long was made on the outer and posterior aspect of the thigh and car-

ried down to the bone. The femur was found thickened and roughened, and there was a small sinus, about the size of a lead-pencil, leading down through new bone into an abscess cavity. The periosteum was stripped from the bone, and this new bone was chiselled through for about one or one and a half inches to the cavity. This cavity extended down to the epiphysis and was about ten inches in length. It was laid freely open and thoroughly curetted, and deep down in the cavity were found a number of spicula of bone. (Considerable delay was caused by the spurting of an artery from the bone. This could be controlled only by firm pressure.) Bits of sequestra and quite a quantity of carious bone were also removed. After the bone was thoroughly cleansed and the cavity irrigated it was swabbed out and then filled with pure carbolic acid, which was allowed to remain in for ten minutes. Alcohol was then used to counteract the effect of the carbolic acid. The cavity was then washed out with a 2 per cent. solution of carbolic acid and dressed with gauze. There was no reaction after the operation; the temperature remained normal; no pain, the patient feeling very comfortable until about the fifth or sixth day. I brought him before the class, and we removed the dressing and found that there was no discharge on the gauze. In other words, we had converted this abscess-pocket into a perfectly healthy wound. The patient made an uninterrupted convalescence and was discharged from the hospital, perfectly well, April 15th.

Case II. *Gangrene of the Finger.*—This is a case of gangrene of the little finger which came into my clinic yesterday. He was dressed with gauze wet with a 2 per cent. solution of carbolic acid. He has no pain now, though yesterday he was suffering intensely. The hand was hurt a week ago last Thursday night; the pain lasted about four days, and was dressed with a bichloride solution. He does not belong to this clinic, and the gangrene cannot be attributed to the carbolic-acid dressing. If you can pick up the literature far enough back to get it in the bloom of the profession's ignorance you will find writer after writer say that a 2 per cent.

solution of carbolic acid is absolutely inert. You will then go further and find that you cannot use a 2 per cent. solution, for if you do you will have gangrene of the fingers or toes. Both of these stories are untrue. You may have seen me use carbolic acid as freely as water, and I do not believe that any of you have seen a single case where the results have not been perfectly satisfactory. You will all give me credit for being fairly honest at least. I tell you when one of my cases dies upstairs. I show you my cases as they come to me from day to day, and you are at liberty to be in the dispensary and see them for yourselves. You are at liberty to examine the cases and treat them according to our lines and see if you cannot get the same results that we get. I have never seen gangrene follow the use of carbolic acid. If you will take an infected wound and dress it with a 2 per cent. solution you will convert it into a perfectly aseptic wound.

CASE III. *Necrosis of the Ischium.*—This is a case of tubercular disease of the ischium. It was turned over to the orthopedic department, operated upon as a hip-joint case, and kept here from August until some time in January. I took charge of the boy in January and found, under ether, necrosis of the ischium and a sinus which opened into a pus-pocket in the pelvis, holding from six to eight ounces of pus. This was emptied out. The fistulous tract was thoroughly curetted, but I did not dare to go into the pus-pocket in the pelvis very thoroughly with the curette, though I did a little. After washing it out with a 2 per cent. solution of carbolic acid and drying it, I filled the pocket with a 95 per cent. solution of the acid. While the patient was under the anæsthetic the level of the carbolic acid would rise and fall with the respirations, showing that the solution was in the pelvis. Before the operation there was a profuse discharge; to-day there is no discharge of pus, and the patient has a wound that will get well if the doctor will only let it. I found a packing in to-day. When you have an infected wound that has been converted into a perfectly healthy one you will need to use but very little packing. It is then the duty of

the surgeon to lessen the amount of packing, but not too rapidly to lose the good effect of proper drainage, but rapidly enough to gain the good results from the rapidly forming healthy granulations. Never allow old, broken-down granulations to hang around a bone. In order to get down to the bottom of this wound we will put a catheter on the end of the syringe. When we get in about half the contents of the syringe, three ounces, it begins to run out. It went down into the pocket in the pelvic cavity. This pocket is about four inches deep. I am going to leave the wound free, and will give him local treatment. What he needs now is feeding up.

March 29, 1900. This is the case of necrosis of the ischium which I showed you about a week or ten days ago. You recollect that there was a large abscess cavity which extended into the pelvic cavity, holding some six or eight ounces, and that we filled that pocket with carbolic acid, 95 per cent., after curetting it out carefully. We kept up the drainage until we have now reached the point where the pocket is almost occluded. It will hold, I should judge, about half an ounce. As I pass this probe in I notice a constriction, and the tendency is for this constriction to continue closing up and so close up the pocket. The wound is aseptic, it is steadily closing down, and there is nothing further to do but to protect it from outside infection.

In this connection let me speak of my method of caring for diseased joints, and to illustrate I will use this little boy whom I operated upon four days ago.

We found dead bone involving the astragalus and lower tibia and fibula. We made a very free opening on either side of the ankle and curetted it thoroughly, removing all the diseased bone and soft parts, taking away the astragalus entirely; then we thoroughly washed out the pocket, and taking a small pledget of gauze we dipped it into carbolic acid repeatedly and swabbed out every part of this cavity. This process of swabbing, as you recollect, occupied about ten minutes. The cavity was then irrigated with 95 per cent.

alcohol, and that followed by irrigation with a 2 per cent. carbolic-acid solution. The cavity was then thoroughly packed with a gauze bandage wet in a 5 per cent. solution of acid and carefully and thoroughly stuffed into the pocket until it was distended from every point. The foot and leg were enveloped in a gauze compress wrung out of a 2 per cent. solution, confined with gauze bandages and covered with a plaster-of-Paris bandage.

If you recollect, the wound on the inner side went under the palmar surface of the foot, but did not communicate with dead bone. I want you to see the first dressing since the operation, and recollect that at that time we had a pus pocket. You see now, as we remove the gauze, the wound is absolutely clean, that the gauze is dry or nearly so, and that there is no exudate of any kind. I call your attention to the fact that the pocket is well defined and that the surfaces are agglutinated together. This is gained by a complete filling of the cavity with the gauze at the time of the operation. That is one advantage of packing tightly. Too early a dressing following your operation will interfere with your obtaining these results.

You recollect that at the time of the operation we swabbed out this pocket. I now close up the outer opening and pour in through the inner opening a 95 per cent. solution of carbolic acid and allow this to remain for five minutes. I call your attention to the fact that though our patient is only a little boy, he makes no objection to this procedure. It has been a wonderful revelation to me to note the absence, almost entirely, of pain when 95 per cent. carbolic acid is used on the raw surface. I now wash out the cavity with 95 per cent. alcohol, follow that by irrigation with a 2 per cent. solution of carbolic acid, and then repack the cavity with gauze wrung out of a 5 per cent. solution. This dressing will be changed again in four or five days, and the same procedure will be followed at the same intervals until the wound presents a healthy granulated surface throughout, which will in all probability be about the third dressing; then, having

a perfectly healthy wound, with perfectly healthy granulations, there is no occasion for the use of any carbolic acid of any strength whatever, and it is my custom to avoid using any solutions upon healthy granulations, if you will cleanse the wound by removing your gauze, which will leave a clean wound, and repack it again with gauze wrung out of a 2 per cent. solution. This is the time when the packing should be put in very much looser so as to enable the wound to fill up very rapidly with healthy granulations.

Case IV.—This patient is one whom I showed you in the operating-room ten days ago. You will recall that she came in the hospital with a diagnosis of suppurating appendicitis. Examination showed that she had a large tumor occupying the right iliac fossa. It was about the size of the adult head. The mass was partially fixed and very sensitive. At the time of her admission her temperature was 102° F., pulse 110, respiration 28. A careful mapping out of the abdomen convinced me that we did not have an appendicitis to deal with, although I was not positive as to the character of the growth, expressing the opinion that it was something in connection with the broad ligament and that there were indications of suppuration. We made a good, free incision and found an ectopic gestation in combination with a dermoid cyst. Suppuration had gone on, and we had about twelve to fourteen ounces of pus I should judge. The intestines were wrapped around this tumor, the adhesions were firm, and the omentum was adherent to the anterior surface. We succeeded in dissecting it off and getting at the tumor. I irrigated the cavity with a 5 per cent. solution and put in a gauze drain. From the time of the operation there has been no increase of temperature or pain, the bowels moved in twenty-four hours, and she is feeling perfectly well.

The gauze drain was removed on the third day, the wound was found aseptic and was brought together by adhesive strips. You see now she has made a complete recovery, and will leave the hospital in a day or two.

I have gone thus hurriedly in the time allotted to me over

a subject that would admit of unlimited time, in the hope of engaging your attention and exciting your interest in what has been called by Prof. William H. Thompson, President of the Academy of Medicine of New York, "the greatest discovery of the century." Greater than that of Jenner, for his discovery was limited to the treatment of smallpox only; greater than that of Morton, for etherization is resorted to only where operations are necessary. The germ of infection you have with you always, and the prevention and cure of infectious diseases spreads its broad mantle to an almost unlimited extent.

I have fought the prejudices of the medical profession bravely and unflinchingly all these years, buoyed up in the knowledge that I possess information which, if I could get it accepted by the profession at large, would limit the sufferings of humanity beyond our wildest dreams. Sometimes, when met by ridicule and unjust criticisms, I have felt like dropping the fight, and I have only been sustained by the gratitude of the many sufferers whom I have cured during these years and by the absolute knowledge that I was right and that right was power. I beg of you not to turn an unwilling ear to me, but rather to hold out your hands and help me carry the good news from one end of the world to the other—the good news that no longer is the germ of infection to have an unopposed sway from life to death, but rather that with carbolic acid we can meet him successfully even upon the brink of the grave.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—Mr. President: In the restlessness which characterizes this age, and the undignified haste with which we take up new things, we are apt to consign to the waste-basket old things of value. In reading the history of my specialty (gynecology) I have repeatedly noted procedures, advised and abandoned in the early part of the century, taken up again and found useful under new names.

I think, too, that we have too generally abandoned the use of carbolic acid, and therefore thank Dr. Powell for his timely paper. We owe to carbolic acid the development of all that we now have that is best in surgery. The aseptic system of surgery had its birth in the fumes and the spray of this drug. Now, Mr. President, if I were to ask my confrères who was the originator of the great antiseptic system and the use of carbolic acid, the name of Lister would spring from every lip; and if I were to inquire what was the special merit of Lister's discovery, they would say at once the establishing of the fact that germs of putrefaction entered wounds and there produced suppuration, and associated with this scientific induction was also the timely discovery that carbolic acid destroys or inhibits the germs and so prevents their development and does away with suppuration.

I have been recently deeply interested in reading a book written in 1865, two years before Lister wrote. by a distinguished Frenchman, whose ideas at that time were in accord with those advanced by Dr. Powell to-day. It affords me great pleasure to give credit to this remarkable man for his pioneer work in connection with wound infection and the use of carbolic acid. His name is G. Declat, the author of a book, in 1865, *New Applications of Phenic Acid* (*Carbolic Acid*) *in Medicine and Surgery*, etc. (Here Dr. Kelly read extracts from several chapters of the book of Declat, as, for example, the action of carbolic acid in urinary infiltration; its action in cancerous affections; its action in pseudomembranous affections; its action in diseases of the uterus, etc.)

Dr. J. McFadden Gaston, Jr., of Atlanta, Ga.—I feel like saying a few words on this subject, having mentioned it yesterday in conversation with Dr. Long, my father knowing it would come up and that he himself would not be here to take part in the discussion. I wish to say, in corroboration of what Dr. Powell has said, that alcohol has a distinctly antidotal effect upon carbolic acid, and in regard to the history of this subject I have a few words to say. I would like to ask Dr. Powell at what date he first reported his observations on alcohol as an antidote of carbolic acid.

Dr. Powell.—I think it was in August, 1894. I read a paper before the Medical Society of the County of New York in February, 1899, on this subject.

Dr. Gaston (resuming).—I wish to say that my father has been using it since 1894, and in that year we had an accident in surgical practice in removing a large cystoma. In this case we were to have used the A. C. E. mixture (alcohol, chloroform, and ether), and instead of using this mixture the prescription was put up alcohol and carbolic acid, and this was inhaled. The case was reported at the meeting of the American Medical Association held in this city. In the *Twentieth Century Practice of Medicine* you will also find, under the head of "Pyæmia and Septicæmia," an article on the use of carbolic acid, and then, under antidotes, you will find alcohol mentioned. This article was published in 1898. It was written much earlier than that, and in the article it is mentioned that alcohol is one of the antidotes of carbolic acid, and was discovered as such in our experience first by this case of inhalation of carbolic acid for nearly an hour, with the use of alcohol by mistake in the solution, and therefore what I want to say is in corroboration of the views of Dr. Powell and not in criticism of them. I wish to strongly urge the claims of alcohol as an antidote for carbolic acid. I noticed that Dr. Phelps laid claim to this discovery as new, in an article in the *International Journal of Surgery* not a year ago, but we did not write to the editor of that journal at the time contradicting it.

Dr. Willis G. Macdonald, of Albany, N. Y.—I have known of the views of Dr. Powell in relation to carbolic acid quite as far back as when he made his first published report, and at that time I looked upon his notions with a considerable degree of skepticism, and this aroused his personal antagonism toward me on several occasions; but after all of my skepticism with regard to his methods of use of carbolic acid, I have on different occasions employed it, and certainly this method of treatment presents valuable features in a limited sense. I cannot quite agree with him as to the very wide application of carbolic acid. It is well worth remembering that many of the things used by Declat, of whom Dr. Kelly spoke, were also used very much earlier in the history of medicine by John Hunter, a description of which can be found in his work and quoted subsequently by some of the German authors. Lister, in 1868, in an address before a meeting of the British Medical Association held at that time, recommended pure carbolic acid, and its use in the treatment of wounds

was applied only to the treatment of compound fractures, and the dressings which he employed were to soak the lint in carbolic acid and apply it over the wound at the seat of fracture.

I cannot agree with Dr. Powell as to the absolute innocuousness of carbolic acid. In the early days when we were using a large amount of carbolic acid spray, I have seen occasions, after being in the operating-room for a considerable time, when my own urine was perfectly black. My confrère, Dr. Vander Veer, has never really absolutely recovered from the effects of chronic carbolic-acid poisoning. My use of it has been much more restricted than that of Dr. Powell. I have used it very largely in the treatment of cavities, such as, for example, old psoas abscesses. I do not make puncture in those cases, but I lay the whole track of the abscess open, following the border of the crest of the ilium and back to the tip of the apex of the twelfth rib, making an incision directly down, so that the entire cavity is opened up, then using a sharp curette, cleaning out the pyogenic membrane, putting in 95 per cent. carbolic acid, following it by alcohol, washing it out subsequently with normal salt solution, and the entire wound is closed by sutures, with the exception of a trivial drain in the loins. In a considerable number of such cases you will get primary healing of an extensive abscess cavity. Of that I am positive, because I have had the opportunity of doing it in more than a dozen cases in the last two years. In other abscesses whose walls we cannot extirpate I believe it to be a preferable plan of treatment to excise the abscess instead of opening and draining it. This plan of treatment is undoubtedly of great value.

I do not agree with Dr. Powell in placing erysipelas patients in the same ward with other patients with clean wounds. I think it is impossible, even with carbolic acid or any other agent, to make this a safe procedure.

Time is too limited to enter into an extended discussion of this matter, but I am firmly convinced that there are limitations to the use of carbolic acid. With regard to the treatment of infected cases, if I were disposed to be hypercritical I might say that fifty infected cases at the clinic is too many under any circumstances.

Dr. E. Denegre Martin, of New Orleans, La.—I have used carbolic acid very extensively in my practice, and have also had some experience with alcohol as an antidote. In this connection

I wish to report two cases showing the neutralizing effects of alcohol upon carbolic acid. The first was an accident which occurred to a physician who was preparing his hands to assist in an operation. Mistaking a bottle of carbolic acid for listerine, he poured the contents upon both hands, not discovering his error until the skin had turned white and began to sting. I at once poured alcohol over them, made him rub it in freely, and in a few minutes he was entirely relieved and assisted in the operation without inconvenience.

The second is a case of attempted suicide. As the story is told, a young woman attempted to destroy herself by taking carbolic acid. In order to disguise the taste she took a teaspoonful in a whiskey toddy, with absolutely no ill effects. This I should consider a fair test of the antidotal effects of alcohol on carbolic acid.

Dr. Frank A. Glasgow, of St. Louis, Mo.--I would like to make a few remarks supplementary to those of Dr. Powell. I have been deeply impressed with the innocuousness of carbolic acid, applied locally, when mixed with pure glycerin. We can inject under the tissues a 20 or 25 per cent. solution of the acid with perfect impunity, and patients suffer less from its use when applied in that manner. I have a number of times injected 15 and 25 per cent. solutions of carbolic acid into the lymphatics without causing any sloughing. I have used it for years in the treatment of carbuncles, injecting it through the carbuncle, its outer border, and over the surface, without noticing any cauterizing effect of the acid whatever. I would suggest the use of glycerin, which chemists place among the alcohols, I believe, because it has as good an antidotal effect as pure alcohol. Those who have used it know that it does away with the caustic effect of the acid. Whether it will do away with the effects on the kidneys I do not know.

Drs. Macdonald and Kelly do not go far enough back in their discussion of the early use of antiseptics and carbolic acid.

The ancient Egyptians were the first to use gauze and antiseptics for their preservative effects.

The first time I saw an Egyptian mummy in the British Museum I recognized where Lister probably got his idea. The mummies are wrapped in cheese cloth. We are told that they used spices and gums to preserve the body. Some of the essential oils are excellent antiseptics.

Dr. R. R. Kime, of Atlanta, Ga.—I wish to call attention to a combination of carbolic acid and gum camphor in cases of sepsis. Whenever you have a hand or a finger which is infected the application of carbolic acid and gum camphor will afford relief. I have less fear of trouble in cases of tetanus after the use of gum camphor and carbolic acid than any other agent I have employed. It is the most universally useful preparation I have ever tried in all the range of surgery. It is particularly applicable in sores or wounds, in cases of septic infection with enlargement of the gland extending up the arm. Three weeks ago I had such a case in which I opened up the wound and used this application, and the patient made a rapid recovery. The crystals of carbolic acid must be melted by heat, without the addition of a drop of water or glycerin, and used in from 33 to 50 per cent. The gum camphor counteracts the escharotic effect of the acid, with but little smarting if the gum camphor is used, two parts to one part of the crystal carbolic acid.

In this proportion it can be used pure on hands to disinfect them after handling septic cases. When combined with olive oil it makes an excellent application to the hands or for dressings—*i. e.*, camphorated phenol, 1 part; olive oil, 2 parts.

Never use any water or glycerin with it, nor use carbolic acid in making it to which glycerin or water has been added to prevent recrystallization.

Dr. James T. Jelks, of Hot Springs, Ark.—Referring to the antidotal effects of alcohol, I would say that I have been washing out the vagina, when infected with gonococci, with pure carbolic acid until the parts were whitened, and then pouring in alcohol, without any unpleasant results following it.

Dr. J. Shelton Horsley, of El Paso, Texas.—I have had a comparatively recent experience in connection with the use of carbolic acid in the case of a Mexican laborer, who, about a month ago, had the last phalanx of his ring finger mashed, the wound having extended to the bone, which was fractured. He was working in a mine, and the employer always kept a 5 per cent. solution of carbolic acid on hand to treat these cases. A cloth was wrung out of the solution and applied to the finger—the ring finger. The dressing covered almost the whole finger. I saw him between the sixth and eighth days after the injury. The digit was entirely gangrenous almost down to the metacarpo-

phalangeal joint. I amputated the finger, and on section it presented the ordinary appearances of dry gangrene. There was no pus present nor any signs of infection. There was a faint red line near the line of demarcation. The adjoining fingers which came in contact with the dressing, but which were not injured at the time of accident, were also slightly gangrenous, though not sufficiently so to justify amputation; but there were distinct gangrenous patches on these fingers.

Dr. George J. Engelmann, of Boston, Mass.—I have seen two cases such as these reported. I have used carbolic acid and still use it a great deal, and I value it greatly. I have employed it in 2½ and 5 per cent. solutions. If a 5 per cent. solution is applied for any length of time to a finger in the manner described it is certainly apt to cause gangrene. This I have never seen in cases of my own, but I know of two instances where precisely this condition did occur, and in one instance, as I was told, after the application of a 2½ per cent. solution for twenty-four hours, and it was not a very liberal application either. I have used it on cotton, with oiled silk covering. Those who secure it at drug-stores and apply it at their own discretion used linen or cotton saturated with the carbolic acid and repeated it a number of times in twenty-four hours. The resulting gangrene is incomprehensible and seems extremely peculiar to me; the question arises whether we have an idiosyncrasy for the carbolic acid itself, whether it is its impurity, whether it is imperfectly dissolved, or whether it is the character of the injury itself—nerve crushing. But the effect was very striking in one case from a weak solution, as I know of it in one instance. I have applied it in some cases for three or four days without injury. But in the two cases I speak of, reported to me, serious results followed and gangrene developed. Of course, I have seen the destruction of tissue during the early days from the use of carbolic acid, when men were not as familiar with it as a dressing as they are to-day. It was usually used in a 5 or 10 per cent. solution, with oil, but some even looked upon the pure fluid acid as *the* surgical dressing, and in two military hospitals under the charge of one and the same man I saw the results of such use. The wounds were cut out as if they had been stamped out to the depth of an inch or so on the thigh, abdominal wall, or wherever this dressing of pure carbolic acid or oil and carbolic

acid, equal parts, had been applied. There was one physician, who was in charge of two small hospitals in one place, who had given directions to use this mixture on account of its cauterizing effect. This was in 1871, during the Franco-Prussian War, in the days of wet dressings. We generally used a 5 per cent. solution, sometimes 10 per cent., and this man, who used equal parts of oil and carbolic acid, simply cauterized the wound and destroyed the tissue. Such gangrene I can understand, but not that from a 2 or a 2½ per cent. solution.

I have used carbolic acid hypodermically as a local anæsthetic, and in some cases the effect was more satisfactory than from cocaine. Of course, we have little call for such use now, but this was just before the days of cocaine, and I tested it in the early days of this local anæsthetic for the purpose of comparison. Even in articular rheumatism carbolic acid, injected hypodermically, proved more effective as a local anæsthetic than cocaine. My attention was first called to its use by a case of articular rheumatism in which I was unable to give any relief. Opium had no effect. The patient was a very nervous woman. I had no morphine with me at the time; it was a little out of the city, and I did not know how to give immediate relief. I had seen reports of the surgical use of a 2 per cent. solution, with sedative effect, and determined to inject this about the painful shoulder-joint. I injected two syringefuls in perhaps 15-drop doses in four places around the joint, and this afforded complete relief. I have used it in articular rheumatism where both knees were affected, using cocaine on one side and carbolic acid on the other, finding a more permanent effect from the carbolic acid. I have used it in cases of neuralgia. Now we have cocaine, but in those days it was extremely satisfactory to secure such effect by using 2 or 2½ per cent. carbolic-acid solution. In articular rheumatism it has given relief, and after two or three applications, one application every twelve hours causes complete relief from intense pain which had previously persisted. My own experience with carbolic acid has been so favorable that I heartily indorse the reader in his urging of a return, to some extent at least, to this excellent remedy, once held so high, now ignored too much.

Dr. J. W. Long, of Salisbury, N. C.—One point touching the use of carbolic acid in surgery has not been dwelt upon

sufficiently, and that is, to get the antidotal effects of alcohol its use must not be delayed too long. There is no question but that carbolic acid will destroy tissue—even a weak solution of it will do so; and I would be loath to introduce a weak solution into any cavity where it could not thoroughly drain out as in the pleura. In connection with the antidotal effects of alcohol following the use of carbolic acid we have in carbolic acid an agent which will be of great service to us. I have frequently demonstrated the antidotal effect of alcohol by washing my hands in pure carbolic acid and rinsing them off with alcohol. Four days ago I extirpated some broken-down inguinal glands, and we all know that an ugly infected wound necessarily remains after removing inguinal glands that have suppurated and broken down. I washed out the wound, poured into it three or four ounces of pure carbolic acid, allowed it to remain about a minute and a half, until the tissues were white, then washed it out with alcohol and dressed the wound with plain absorbent gauze, without any other chemical whatever. I removed the dressing in four days, and was astonished to find that the wound was entirely free from suppuration; indeed, almost all of the inflammatory action in the surrounding tissues had disappeared. I am satisfied that in carbolic acid we have an agent, within well-defined limits, which is of great service in the treatment of suppuration where we have free drainage and can easily control its action.

Dr. A. M. Cartledge, of Louisville, Ky.—I am sorry that I did not have the pleasure of listening to the paper of Dr. Powell. It has been my province to amputate five fingers as the result of application of carbolic acid. It was thought to be a pyogenic infection that caused the gangrene in these cases, but such was not the case. The gangrene was undoubtedly due to the application of carbolic acid. One of my professional friends in Louisville (Dr. Vance) has amputated three fingers for the same condition. We are all familiar with the reports of other surgeons. The local application of carbolic acid under certain conditions is capable of producing a peculiar form of gangrene which is neuropathic in character, and I do not think there can be any question as to that. One of the most pernicious things is the wide-spread impression among the laity that carbolic acid is an everyday remedy, and as soon as a finger is

bruised they saturate a cloth with water and carbolic acid and tie it up. I have seen gangrene result after the application of carbolic acid in such cases, usually confined, however, to the finger. In two cases in which gangrene occurred the carbolic acid was applied by physicians. I do not know the strength of the solution that was used. I have no means of positive proof for making this statement, but I believe one may dip his finger in pure carbolic acid for a minute, take it out, use no alcohol, and gangrene would not be produced; and yet I think it would be one of the most dangerous things to tie a finger over night with a 5 per cent. solution of carbolic acid. It is in this class of cases that I have seen gangrene follow. We ought to protest against the general use of it.

Dr. George S. Brown, of Birmingham, Ala.—I recall one case in which I had to amputate a finger on account of gangrene following the use of carbolic acid. In cases of burns which I have seen the carbolic acid has usually been applied by the patients themselves, and I thought it was because the carbolic acid was not thoroughly dissolved in the water. In taking carbolic acid douches, sometimes the carbolic acid is not thoroughly dissolved in the water, the acid goes to the bottom, and is applied to the parts in its pure state. I believe the finger I amputated was caused in that way by the application of a solution of almost pure carbolic acid.

Dr. Powell (closing the discussion).—Some of those who have taken part in the discussion have drifted away from the subject of the paper. If you recollect, I began my paper by saying that carbolic acid is safe in safe hands. I had no intention of making the claim that carbolic acid should be used in strong solutions for prolonged use under conditions that no sane surgeon would prescribe. We all have seen the bad effects of carbolic acid when used under those conditions.

The late Dr. James L. Little, of New York City, was surgeon to a large manufacturing establishment for many years, where there were about 3000 hands employed in handling carpet-making machinery. Somewhere about the year 1881 or 1882 he presented to the profession what he called a "modified Lister's dressing," which consists in encircling the finger in absorbent cotton wound loosely with gauze bandage, using abundant dressing, and then this being kept wet in a 2 per cent. solution of

carbolic acid. During my association with him of eight years I shared this service, and in looking over our notes I find recorded in all three cases of gangrene of the fingers out of hundreds of cases that had been treated in this manner, and we satisfied ourselves that the gangrene was due to the destruction of a bloodvessel at the time of the injury.

I have never recommended, nor thought of recommending, a 5 per cent. solution of carbolic acid to be applied to the limb or any part of the limb to be tied up and left overnight. Whenever you have used a weak solution of carbolic acid and gangrene has followed, get the history of the case and see if the gangrene has not resulted from the occlusion of or injury to a bloodvessel. I am absolutely sure, and this positiveness is the conclusion after having treated several thousand cases of injury of the hand by wrapping them up as I have stated previously and using a 2 per cent. solution of carbolic acid indefinitely.

I had the pleasure of knowing Dr. Declat when he visited New York, but I had no knowledge of the publication of his book until my attention was called to it by Dr. Kelly, and I am under very great obligation to the doctor for having done so. It does not detract anything from what I have claimed as my method. I made no claim to having discovered carbolic acid or that it was a germicide, and what Dr. Kelly has read from Dr. Declat's work is simply a substantiation of what I have been fighting for. Dr. Declat suffered the ridicule of the profession, not only abroad but in this country, and at the time that I met him, which was somewhere in the early seventies, he had lost his trustfulness toward his medical brethren and evidenced no disposition to talk upon the subject.

You recall that it has been publicly stated that I was a fanatic upon the subject of carbolic acid, that I take it upon my oatmeal every morning, and that a teaspoonful of 95 per cent. three times a day was a small dose for me to indulge in. Had I been of the same temperament, possibly I, too, might have dropped the subject; but, thank God, I have the courage of my convictions, and I shall continue to fight for what I know to be right and true, even though I make only a few converts from year to year. I am glad to say that the conditions are not as bad as this. If I cannot convince any fair-minded man, if he will attend only two of my clinics I will be ready to stand the results.

Dr. Gaston spoke about the time of publication of my article regarding the use of carbolic acid in certain conditions. I have been teaching the use of this agent according to my methods in the Post-Graduate School to my classes since October 1, 1894, and the number of matriculants from that time up to the present numbers over 8000. These men have not only listened to what I have said on the subject, but they have written to me from every country in the world, telling me that my views in reference to carbolic acid were absolutely sound and safe. When I spoke about being ridiculed and derided and laughed down by the medical profession I had reference to the profession in New York city. For a long time I persisted in writing letters to different men, asking them to come to my clinic and see my work, and of getting up in medical societies and speaking of the method of treating these cases with carbolic acid. Usually my statements attracted no attention whatever, but my friends came to me outside and urged me to consider what I was doing.

Referring to the remarks of Dr. Macdonald, I would like to have him tell me if he has ever had a failure from the use of carbolic acid under any circumstances or in any case in which he had used it. It is not such a big thing to have fifty cases of infection in one clinic. A physician who had attended some of my clinics told me that he had counted 130 new cases in one of my clinics. They are there, and I am glad of the opportunity which Dr. Macdonald has given me to invite you to come to my clinic at the Post-Graduate Medical School and see for yourselves these fifty cases of infection and see the methods which I have adopted of demonstrating and proving what I have been trying to tell you in a feeble way to-day.

In reference to the use of gum camphor in connection with carbolic acid, I use a solution of equal parts. It is prepared in the manner in which Dr. Kime described it. The stock of solutions of carbolic acid in my clinic consists in one of half a drachm of carbolic to an ounce of water; another a drachm of carbolic acid to an ounce of water; another is the camphor and carbolic mixture, the 95 per cent. solution, and the 2 per cent. solution.

In reference to the injection of joint cavities with carbolic acid, it is my habit to take cases of infected joints at the earliest stages, particularly where the joint is infected by a cellulitis that extends up and there is an infusion in the joint, and by

inserting the handle of the aspirator we draw out a greenish looking fluid or pus, which is the first step in the infection. If you will draw out the fluid and throw into the cavity a 5 per cent. solution of carbolic acid, fill it up and leave it there, it will kill the infection and not produce any bad effect on the patient. I have used as high as sixteen ounces.

That would seem to answer all the questions as to carbolic-acid poisoning as a result of leaving it too long in the pus cavity. The swabbing out of large pus pockets with pure carbolic acid and being in such a hurry to get rid of it when the surface turns white is laughable from my stand-point. I leave the acid in the cavity sufficiently long to get all the beneficial effects upon the diseased tissue, and when this is done use my alcohol, waiting, perhaps, in some cases ten minutes before using the alcohol. The alcohol is used to limit the action of the carbolic acid; the cavity is then cleaned out with a 2 per cent. solution of carbolic acid and is packed with gauze.

THE TREATMENT OF ABDOMINAL AORTIC ANEURISM BY A PRELIMINARY EXPLORATORY CŒLIOTOMY AND PERITONEAL EXCLUSION OF THE SAC, FOLLOWED AT A LATER SITTING BY WIRING AND ELECTROLYSIS,

WITH THE REPORT OF TWO HITHERTO UNPUBLISHED CASES.

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In view of the undoubted improvements that have been made in recent years in the technique of wiring and electrolysis (Moore-Corradi method) as applied to the cure of aortic aneurism—more especially since the writings of D. D. Stewart and his followers in this country have given a new impetus to this mode of treatment—it is a matter of great importance to determine by actual clinical experience to what extent this purely technical progress has contributed to prolong life or improve the chances of recovery in this usually hopeless class of sufferers. It is evident that a true estimate of the value of the method can only be obtained by a careful study of the reported cases, and as the number of instances in which the more recent suggestions have been applied is still relatively small, especially in the abdominal phases of this disease, and have thus far been inadequate to permit us to arrive at definite conclusions as to the actual value or even the special indications of the method, I have been led to contribute the following recent observation in which the Moore-Corradi method, modified to meet the special exigencies of abdominal

aneurism, was faithfully and yet unsuccessfully applied. In addition to this personal observation I avail myself of the opportunity--thanks to the courtesy of the operator, Dr. F. W. Parham, of this city—to add to this report another unpublished case of abdominal aneurism, treated by wiring alone (Moore method), which presents several features of exceptional interest.

Spontaneous (idiopathic) aneurism of the abdominal aorta (upper cœliac region) in a young subject treated by various methods, including laparotomy and peritoneal isolation of the sac, secondary wiring, and electrolysis (Moore-Corradi method); death, fifty-four days after exploratory laparotomy and nineteen days after wiring.—A. H., aged twenty-three years, a native of New Orleans, tall (nearly six feet in height) and thin; father and mother (both of German origin) living and in robust health; father of distinctly gouty diathesis; mother also rheumatic; two brothers and one sister, all in excellent health. The patient is a telegraph operator and clerk in a broker's office; unmarried. His history is remarkably good from every point of view—very quiet, frugal, temperate, and industrious; he never indulged in alcoholic drinks or tobacco and had the reputation of being a young man of exemplary conduct. His previous history is absolutely negative as to syphilis and other infectious diseases that might account for his present trouble. There is no history of trauma or of indirect violence that will furnish a clue to the causation of the present trouble, except, possibly, that he may have "strained" himself while "punching a bag" in a gymnasium, though he himself never noticed any evil effects from the very moderate exercise that he took in this way.

Until February, 1900, he felt perfectly well. After this date he began to suffer periodically with vague pains in the epigastrium, which radiated to the left hypochondrium and back. He could not account for this pain, as he did not suffer from indigestion and his appetite was not impaired until later, when the pains increased in frequency and severity and sedatives were required to allay them. About three weeks

before my first examination (about May 28, 1900) he first noticed a pulsation in the epigastrium, which became progressively more perceptible and vigorous every day. Dr. Moore, who was called to attend him about this time, made the diagnosis of aortic abdominal aneurism, and prescribed sedatives to relieve the pain, which now kept the patient constantly in bed and entirely incapacitated him for his business. When I saw him, in the last week of May, 1900, I found him in bed, looking very pale and emaciated, his whole expression indicating great distress and physical suffering. He was lying on his left side in his favorite attitude, curled on himself, with his limbs flexed and with his hands clasping the sides of his chest and epigastric region. As he turned on his back to speak to me he complained of the pain caused by the movement, and I noticed a prominent bulging mass pulsating vigorously in the epigastric region, where it was limited to the left half and extended under the left costal arch. On deep palpation the pulsating mass could be felt springing apparently from the depths of the abdomen near the vertebral column, its lower boundary limited by a line drawn across the tenth costal cartilages and sloping gradually upward so as to fill the entire epigastrium somewhat in a conical shape, the apex of the cone projecting to the left of the median line. A distinct thrill could be felt superficially, and on auscultation a loud, harsh systolic murmur could be heard with every beat of the pulse. The diagnosis of abdominal aneurism probably involving the cœliac axis and extending in the upper or subdiaphragmatic portion of the abdominal aorta was then established. Apart from the aneurism, a careful examination of all the organs failed to reveal any abnormality. The heart and arteries were normal, the urine normal, and, in fact, the patient had no disease except in his abdominal aorta. The gravity of the case as explained by the attending physician, Dr. Moore, was then reaffirmed and the relatives were informed of the scant prospect of permanent relief. It was suggested, however, that the prognosis would be more exactly determined by an exploratory opera-

tion, which would possibly permit the application of various therapeutic measures that had been found valuable and even curative in similar cases.

This suggestion, in spite of its uncertainties, was immediately accepted by the patient and his parents, who at once transferred him to the Touro Infirmary. He was admitted to the Infirmary on June 1st, and on the fourth day after his admission an exploratory laparotomy was performed under chloroform. A four-inch incision was made in the median line to the left of the most prominent part of the tumor. Upon opening the cavity the first organ that made its appearance was the pancreas, which was stretched over the highest point of the convexity of the tumor and was in immediate contact with the abdominal wall. The splenic vein and artery, both of unusually large size, were seen stretched immediately above the pancreas, directly in the path of a trocar or needle had this been used to explore the tumor or to wire it without previous laparotomy. The stomach was displaced downward, and the cardiac end and lesser curvature were stretched in a curved line immediately below and to the left of the dome of the tumor, leaving the pancreas, splenic vessels, and third portion of the duodenum on a more superficial plane. A careful palpation of the tumor with the hand introduced through the wound demonstrated that the aneurismal sac was connected with the abdominal aorta and involved its immediate subdiaphragmatic portion, extending down in an ovoidal shape to a point approximating the superior mesenteric vessels. Palpation of the tumor gave the impression that it was as large as a fœtal head at term. It pulsated vigorously all over its surface, but in the right half of the sac there were some thick (probably fibrinous) deposits. The aneurism in the course of its rapid development had displaced the posterior peritoneum upward and forward, carrying with it the pancreas, splenic vessels, and duodenum, which now rested upon its surface and in immediate contact with the abdominal wall. Having in view the trial of the Moore-Corradi-Stewart method of treatment, I decided to

suture the peritoneal envelop of the tumor to the anterior parietal peritoneum, thus excluding the general cavity and favoring all subsequent treatment by establishing a direct extraperitoneal route to the aneurism. This point of the programme was carried out by partially detaching and displacing the pancreas and splenic vessels upward and thus clearing a space between them and the duodenum and stomach and suturing these organs in place, thus leaving a small interspace, the size of a dollar, which represented the free peritoneal surface of the aneurism. The parietal peritoneum in the wound was then sutured to the periphery of the exposed areas and the abdominal wound was closed by (catgut) sutures in layers, leaving the centre of the incision open where the surface of the aneurism was exposed. A gauze pack was left *in situ* and the patient was sent to bed in good condition.

The patient recovered from the effects of the exploratory laparotomy without incident worthy of special mention. The wound healed *per primam*, leaving a broad surface the size of a silver quarter in the centre of the incision, which healed completely, by granulation, in two weeks. In this way a direct and safe route to the centre of the aneurism had been created. Five days after the operation the patient was put on the Valsalva-Tuffnell treatment, and an ice-cap was kept constantly over the aneurismal region. On June 9th he was given, in addition, 3 minims of Norwood's tincture of veratrum viride every six hours. Codeine was given to relieve the pain, which had become less severe, but still persisted in keeping the patient awake at night. On June 13th, 12 ounces of sterile gelatin, in normal salt solution, 10 per cent. (Lancereaux's treatment), were injected under the skin in the left subscapular region. The patient suffered considerably from pain at the site of the injection, and the temperature rose quickly to 105° F., but this finally subsided to normal and did not return. The patient, however, was so much disturbed by this treatment that he begged me not to repeat the injection. The gelatin solution should have been made 3 or 5 per cent., and the intense reaction was evidently due to the

excessive concentration of the solution. The severe reaction caused by this strong gelatin solution is worthy of notice.

Up to July 5th (one month under observation and treatment after exploratory laparotomy) no marked improvement was noticed. The pulsation in the aneurism was not so marked, the swelling was less prominent, and the pains were less severe; but all this was easily accounted for by the great rest, the constant application of the ice-bag over the aneurism, diet, and arterial sedatives which diminished arterial tension and slowed the circulation. In reality the patient was growing worse; he was weaker, and inability to rest at night, with codeine and even morphine, was evidence enough that the aneurismal process was going on.

Therefore, on July 5th (one month after laparotomy) the abdominal cicatrix was cocainized with a Schleich No. 1 solution and the aneurism was needled on the Macewen plan. A long, sterile steel hat-pin was used for this purpose, and its point was made to rub gently over the posterior and lateral walls of the sac. Two aseptic needles were introduced and left *in situ* for one and a half hours, after which they were removed and the punctures closed with collodium and cotton. No noticeable local change followed this procedure, and in view of the patient's progressive decline we decided to give him the benefit of wiring combined with electrolysis (Moore-Corradi method). After considerable experimentation with various kinds of wire in artificial aneurisms (bladders, rubber balloons, and bottles) on the part of my able assistants, Drs. Urban Maes and John Smyth, it was finally decided to use drawn silver wire. This wire was especially made by a manufacturing jeweller, and formed a perfect coil after passing through a four-inch straight needle. This wire, when drawn, corresponded in size to the No. 00 Hartmann combination spool wire such as is used for banjo strings, and is about No. 28 gauge and 0.0085 inch in diameter. A four-inch pointed canula (calibre of a No. 2 Dieulafoy aspirating needle) was insulated (by a professional electrician) by coating with shellac and tried with the wire, which fed through it without trouble.

On July 9th, after anæsthetizing the cicatrix with Schleich No. 1 solution, the insulated needle was introduced directly into the centre of the cicatrix. No blood appeared until the needle had penetrated two and a half inches, when it began to flow freely, but ceased promptly as soon as the wiring was begun. At 11.55 A.M. the wire was introduced, with the patient in good condition. Pulse 90, good quality. At 12.10 P.M. ten feet had been introduced and much more could have been used, but we stopped at ten feet in accordance with our programme. The positive pole of a galvanic battery (dry chloride of silver cells) was attached to the wire and the negative was connected with a large flat metal electrode applied to the lumbar region. Seventy-five milliampères were gradually reached, the patient feeling the negative pole burning slightly. A large wet absorbent cotton pad was applied under the electrode on the back. At 12.13 there was slight pain, and an ice-cap was applied to the abdomen over the tumor. At 12.25 the current was increased to 125 milliampères; pulse unchanged. From this time the needle of the meter began to oscillate and registered 102 milliampères with the same number of cells, apparently indicating little increase in resistance. As the patient was very comfortable at this time the current was very gradually increased to 200 milliampères. After this the current fluctuated considerably, registering at

1.26 P. M.	200 milliampères.
1.45 "	210 "

At this time the current was discontinued and a new, wet flat electrode applied to back; pulse 82. At 1.50 P. M. current gradually brought up to 200 milliampères, and fluctuated as follows:

2.13 P. M.	150 milliampères.
3.00 "	120 "
3.20 "	85 "
3.40 "	80 "
3.50 "	90 "
4.24 "	120 "
4.30 "	120 "

The electrolytic sitting, which had lasted four hours and twenty minutes, was discontinued at 4.30 P. M., with the meter pointing to 120 milliampères.[1]

At the end of the sitting the patient was very cheerful and apparently as strong as at the beginning of the operation. He complained only of some burning in the back at the seat of the large electrode. His pulse was 82, respiration and temperature normal. He took fluid nourishment several times in small quantities during the procedure. The wire was cut close to the skin while the abdomen was being pressed down, so that when the pressure was removed it completely disappeared from view. The opening was sealed with cotton and collodium.

At the close of the sitting there was evidence that a decided impression had been produced upon the tumor; the pulsation was markedly less vigorous; there was a tendency to epigastric retraction rather than fulness, and the tumor was much firmer and harder to the touch. Auscultation showed that the bruit was much fainter and could only be heard over a space two inches in diameter just to the left of the line of the cicatrix.

On returning to his room the patient slept from the effects of a hypodermic of morphine given while on the operating-table. He was very hopeful, complained less, and the tumor in the epigastrium gave evidences of undoubted improvement, becoming more markedly retracted every day, but the improvement was only transitory; after three days the patient began to complain again of severe pains in the back and left upper lumbar region. The temperature ranged from 98° to 100° F.; the pulse, 96 to 100. He found relief only in morphine, and he took practically little or no nourishment. The emaciation became still more marked, and finally complete discouragement took possession of the patient. In the meantime it was evident that coagulation had taken place in the most prominent part of the tumor, as the murmur and

[1] I desire especially to thank my faithful assistants, Drs. Maes, Smyth, and Clark, who carefully observed the patient with me throughout this long electrolytic sitting.

pulsation had greatly diminished anteriorly. The aneurism had retracted, however, only in one direction; it was evidently subdued only in one place (anteriorly) to become more aggressive in another. The constantly increasing pain and perceptible bulging in the left hypochondriac and lumbar regions pointed to the posterior surface of the tumor, to the left of the vertebral column, as the chief seat of mischief. About this time the patient manifested a desire to return home, and he was taken to his residence July 17th, eight days after wiring. From this time on to the end he was seen by his attending physician, Dr. Moore, and was heard from only occasionally. He suffered greatly and grew constantly weaker, paler, and thinner, finally expiring in the midst of a convulsive tremor on July 28th, nineteen days after the introduction of the wire and the application of electrolysis. During the last days of his life he had to have a quarter of a grain of morphine every three hours to secure any rest at all.

No autopsy could be obtained, but the family allowed a small exploratory incision. This was done by Dr. Maes, who found that the sac had retracted from the abdominal wall and was very firm to the touch. On opening the sac the wire was found firmly embedded in organized and laminated clot, which filled the sac with the exception of a small area where the sac was adherent to the abdominal cicatrix. The wire was gradually withdrawn and its course definitely and clearly mapped out with the finger. It was found to occupy nearly two-thirds of the sac below an opening, one inch in diameter, which communicated with a diverticulum of huge size which filled the left hypochondriac region. The sac containing the wire was fusiform in shape, about one inch in diameter, evidently very much contracted and in process of obliteration. The aorta, however, practically emptied itself into a vast pouch apparently of recent formation and with very thin walls, which had ruptured on the night of July 27th. The wire after removal showed no marked signs of corrosion, except staining, and formed a small bunch which weighed exactly twenty-four grains (ten feet).

The lessons to be gathered from this case are numerous and instructive, notwithstanding the unfortunate termination and the fact that we were denied the opportunity of making a complete and satisfactory examination of the aneurism and abdominal cavity and thus studying its exact anatomical characteristics and relations. Before proceeding with the conclusions which refer to the value of the method it will be well to note, first, the unusually early age of the patient (twenty-three years, the youngest in the series of fifteen cases of abdominal aneurism treated by this method); secondly, the absence of any antecedents—syphilis, alcohol, or trauma—that would favor the development of arterial disease; third, the comparative acuteness of the aneurismal process, which ran its course in less than six months if we count from the date of the first symptoms to the date of death. Then, as bearing upon this particular mode of treatment, the high cœliac or subdiaphragmatic position of the tumor, and the fact that it was a saccular aneurism, though this could not be absolutely determined by the physical signs before death. In regard to the treatment it is worthy of note that, notwithstanding the most rigorous dietary, absolute rest, constant application of ice over the tumor, and the use of arterial sedatives, the tumor progressed uninterruptedly in its onward march. It is well to observe the very high reaction and decided local disturbance produced by the large administration of strong gelatinous saline solutions. In this case fully one pint of a 10 per cent. solution was injected by hypodermoclysis, and caused a rise to 105°. It is evident that large injections, especially of such exceedingly concentrated solutions, should not be tried, but that Lancereaux's rule to inject small quantities (6 to 8 ounces) of 2 to 3 per cent. solutions continuously and at regular intervals should be followed.

In my personal experience with this method, which I have tried systematically for thoracic aneurism in three cases, the results have been invariably negative; nevertheless, in view of the relative benignity of this treatment and the success obtained by others, I would be in favor of trying those

injections systematically in all cases as an adjuvant to other treatment.

As to the procedure itself, we must notice the long electrolytic sitting (the longest thus far recorded, four hours and twenty minutes) and the high milliampèrage of the current. I must confess that I am somewhat at a loss to account for the remarkable resistance and lack of complaint of the patient with so strong a current as 200 milliampères; and were it not that the canula had been very carefully insulated and the milliampèremeter was tested and found perfectly reliable, I would be inclined to doubt that so strong a current had ever been passed into the aneurism.[1]

The most important fact to be noticed, however, is that the passage of this strong current for so long a time did have a very positive and prompt effect in favoring the coagulation of the blood in the sac, and, as the necropsy showed, that part of the sac which had been invaded by the wire had been completely consolidated with firm and adherent clot and was practically cured. What, then, caused the failure of the method? Death was caused ultimately by rupture of the sac, or, rather, by a diverticulum of the sac which had evidently developed after the introduction of the wire and after the rapid formation of a large coagulum in the main cavity of the tumor. We must presume that in this instance the aneurism was formed by a multilocular sac, and that only a part of the sac was filled with clot, while another section which had not been reached by the wire remained uncoagulated and had continued to receive the whole force of the aortic current. Under the strain of this increased intra-aneurismal pressure the sac yielded rapidly at this point and formed a diverticulum or secondary sac which ruptured finally

[1] That currents stronger than 70 milliampères are liable to cauterize and do harm is shown very clearly in Dr. Huuner's recent paper (Johns Hopkins Hospital Bulletin, November, 1900) by the sloughing of the skin of the back at the place where the negative electrode was kept in contact with the skin in one of Dr. Finney's cases. In this case a current of 70 milliampères was kept up for one hour. In our patient the only observable local effect on the skin was to produce a marked erythema which passed away without leaving any trace behind it.

into an undefined, extra-aneurismal space in the left hypochondrium. Here, then, is a danger which no amount of intelligence or foresight on the part of the operator can possibly eliminate, and which must remain a serious menace to the patient even when all the other conditions for success have been otherwise fulfilled.

Another point to which we would direct attention was the adoption of a plan of operation in two sittings, with four weeks' interval between them, the advantages of which do not appear to have been considered by previous operators, who have invariably explored the tumor, and, after wiring and applying electrolysis, have closed the abdomen. By operating in two sittings there are at least two distinct advantages to be gained. In the first place, the exclusion of the general peritoneal cavity by systematically suturing the parietal peritoneum to the edges of the wound to the retroperitoneal covering of the surface of the tumor adhesions are produced between the aneurism and the abdominal wall over a well-circumscribed area. When this is done as a preliminary procedure it undoubtedly diminishes the dangers of peritoneal contamination and shock which are likely to occur during a long electrolytic sitting. The wiring of the aneurism is then accomplished at a later date, when the wire can be inserted and electrolysis applied under simple local anæsthesia. In this way the electrolytic current can be applied for an indefinte period of time with deliberation, and in the same simple conditions in which it is applied in thoracic aneurisms. Dr. Parham was the first to resort to the open method of observing an abdominal aneurism by simply walling off the sac with gauze. He did this, however, after wiring had been done, and chiefly with the view of controlling hemorrhage from the point of puncture and better to observe the subsequent course of the aneurism. I regard this suggestion as a distinct advance in the technique.

In submitting the report of this case it is not the writer's purpose to discuss the purely technical features of the method

adopted,[1] it being his chief object to consider this subject in the light of clinical results as observed in the treatment of the abdominal type of the disease. While the Moore-Corradi method has found its largest field of application in the treatment of the thoracic aneurism probably because these are much more frequent than the abdominal (175 thoracic to 59 abdominal, Crisp; 83 to 9, Lebert), and because in advanced thoracic aneurism the subcutaneous character of the tumor favors this mode of attack even at the hands of physicians not especially skilled in surgical manipulations, it is nevertheless true that abdominal aneurisms, as a class, are better adapted to test the real value of the method. With the advance of abdominal surgery, abdominal and intraperitoneal exploration has been made comparatively safe, and in this character of the aneurism its mode of origin, approximate site, and other important topographical relations and anatomical characteristics are more easily determined than in the thoracic aneurism, which can only be studied at a distance and chiefly by physical signs. Limiting our inquiry, therefore, to the abdominal aortic aneurisms, let us bear in mind, first, the essential principles which underlie the therapeutic and curative action of the wiring and electrolytic processes as applied to the condition. The Moore-Corradi method aims fundamentally at arresting the circulation of the sac by inducing a coagulation of its contents. It aims at the production of a firm, resistant, adherent clot which shall fill the sac and coagulate its orifice of communication with the vessel of supply. The formation of this plug is essential to block the orifice of the sac and arrest the circulation. At the present

[1] This aspect of the question is very fully and ably presented by Dr. Guy L. Hunner, of Baltimore, in his masterly essay published in the Johns Hopkins Hospital Bulletin of November, 1900, vol. xi., No. 116. This contribution, which is the most comprehensive and instructive that has recently appeared on this subject, reached me after this paper had been written and the bibliographical research had been completed. In the revision of this article, after it had been sent to the Secretary of the Association, I have been able to strengthen my original conclusions by reference to many suggestions made by Dr. Hunner, and also by availing myself of the most instructive and carefully reported cases operated on by Drs. Halsted and Finney in the Johns Hopkins Hospital, which have been abstracted and added to the supplement appended to this paper.

moment, in view of the experimental evidence which has accumulated on the subject, no one will deny that the modification first proposed and practically applied by Corradi (1881) to Moore's simple method of wiring (1864), to the effect that the mechanical action of a wire in favoring the deposition of fibrin would be very much intensified by passing through it a galvanic current of definite strength, which would act upon the blood in virtue of its electrolytic qualities, as a distinct advance on the Moore method. The influences that are therefore brought to bear in inducing the coagulation of the aneurismal contents by the combined method are threefold —mechanical, biological (tissue or cellular reactions), and chemical, the last being probably the most important feature in inducing the prompt precipitation of fibrin through the decomposing power of the electrolytic current.

Without attempting to trace the various histological stages which have marked the gradual evolution of the technique from 1864 to the present time, suffice it to say that under favorable conditions these three agencies—mechanical, biological, and chemical—amply suffice to bring about the desired results, viz., prompt coagulation of blood, with the formation of a firm, adherent clot. As a result of the modifications brought about by the combined efforts of surgeons and physicians who have labored to perfect both the surgical and the mechanico-electrical phases of the technique, the essential features of the method resolve themselves as follows:

1. A thorough exploration of the tumor, made safe by aseptic cœliotomy, which permits a recognition of the approximate anatomical seat and relations of the tumor and furnishes important information as to its anatomical characteristics—an advantage that is denied in thoracic aneurisms.

2. The safe exposure and even permanent isolation of the point of attack in the most accessible part of the tumor by the formation of adhesions between the sac and the abdominal wall—a point which we believe has been shown to greater advantage in the two cases that are reported in this paper,

though the methods adopted by Dr. Parham and myself were different and we were guided by different purposes—is worthy of adoption in all cases, as it diminishes shock and the liability to peritoneal contamination.

3. The introduction at a second sitting (when adhesions have formed and the sac has become practically extraperitoneal) of a highly drawn fine snarled silver wire, which should not exceed a No. 28 gauge (0.0085 of an inch) in diameter. The wire may be of gold, as suggested by Stewart, or of silver blended with copper alloy, as suggested by Hunner; but it is evident from our experience and that of others that sterling silver will meet all the indications.

4. The wire should be fed or carried into the aneurismal sac through a fine and carefully insulated trocar or canula (shellac, celluloid, or rubber being used as the insulating agents, shellac being most convenient), the calibre of the canula not exceeding a No. 2 Dieulafoy aspirating needle.

5. The wire should be always tested before its application, to determine the following points: (*a*) That it will coil after feeding through the canula; (*b*) that it will coil in large, irregular loops, in order that its distribution over the largest possible surface may be insured; (*c*) that it shall not form a short continuous spiral with such spring and force as to exercise injurious pressure upon the aneurismal walls, or, after finding its way into the aorta through a large orifice, spring, as it were, into the heart itself. Furthermore, it is important that the quantity of wire used should be adjusted to the size of the aneurism, in order that the retraction of its walls after coagulation may not be interfered with (as happened so disastrously in several instances) owing to the resistance offered by the wire itself. As a rule, ten feet of silver wire, highly drawn and snarled, will suffice for the average aneurism, though larger quantities (fifteen and twenty feet) are advised according to the size and approximate capacity of the aneurism. Practically it may be said that ten feet are amply sufficient, as is proved by the fact that in the three recorded cases in which a permanent cure has been obtained

(Morse, Langton, Noble) the maximum length of the wire was ten feet.

6. As to the electrolytic current, this should be furnished by a galvanic battery (the portable dry chloride of silver appeared to have been most generally used in this country), with the positive pole attached to the wire and the negative electrode, well covered with a wet cloth, to the back, are the essential requisites. A milliampèremeter should be connected with the circuit to indicate the strength of the current, which, according to the most authorized opinions, should not exceed 70 milliampères, for fear of caustic effects. The intensity of the current and the duration of its application will vary within wide limits, according to the condition of the patient and the effect upon the tumor. By following the plan adopted in our case the sitting was prolonged four hours and twenty minutes without any appreciable bad effects. Without a previous cœliotomy and the preliminary formation of adhesions, which made the sac practically extraperitoneal and rendered general anæsthesia unnecessary, so long a sitting would have been impossible without great risk of peritoneal contamination and shock.

7. The coincident administration of gelatin injections (3 per cent. gelatin dissolved in decinormal saline solution, 0.7 per cent. salt) in 6 or 8 ounce doses by hypodermoclysis, as suggested by Lancereaux, may prove beneficial as an adjuvant to rest, diet, and other general measures of treatment.

So much, then, for the technique of the method. Now as to the indications. Is the Moore-Corradi method applicable to all forms of abdominal aneurism, or are there special anatomical conditions which are decidedly more favorable than others for its successful application? Thus far we have been able to collect the records of fifteen published cases of abdominal aneurism treated either by wiring alone or by the combined methods since the distinguished Professor Loreta first introduced Moore's method in abdominal surgery in 1885; and after investigating these records carefully we notice that in no instance did the operators specially attempt

to define the conditions which they regarded as particularly favorable to the application of the method. In every instance it appeared to be taken for granted that, as other non-surgical modes of treatment had failed and the patients were hopelessly drifting toward certain death, they were justified in resorting to this expedient with the hope that it would determine a cure by process of coagulation. In three only (Morse, Noble, Langton) out of fifteen abdominal aneurisms has this hope been realized and the courage of the patient and of the operator has been rewarded by obtaining a permanent cure.

In two, or possibly three, other instances (Loreta, Pringle-Morris and Finney's case No. II.) wiring alone and wiring with electrolysis has been followed by a decidedly favorable impression upon the tumor, though the beneficial effect on the patient was, with the still doubtful exception of Finney's case, only temporary. Loreta's patient died in ninety-two days, from rupture of the aorta below the aneurism, which had been cured; and in Pringle-Morris' case the tumor was undergoing coagulation when the patient succumbed, on the fifth day from traumatic delirium and exhaustion. In Finney's case the patient's subjective sensations improved, but the aneurism was practically unchanged one month after the operation. If we class these cases as improved, either in a local or general sense, we would be justified in stating that in five out of fifteen cases (33.3 per cent.) a favorable impression was produced by this treatment, in three of which only (or 20 per cent.) the cure was permanent. In the remaining ten cases the aneurismal condition was either not improved or was aggravated by the procedure; in all 66.6 per cent. in which the method failed to improve the local condition or to prolong life.

In view of these facts, it is evident that there must be a certain comparatively small percentage of cases of abdominal aortic aneurism that come to us for treatment which are favorable to this method, and another, a much larger group, which is not amenable to this procedure and in which it is contra-indicated.

It may be argued that in some of these fatal cases a better technique might have avoided some of the bad results or that in some of these patients the disease was so far advanced that they were already hopeless when the treatment was applied. Granting that this may be true in a few instances, we believe the bad results were in the main attributable to inherent dangers of the method itself apart from all questions of technique.

It is evident after a careful consideration of the anatomical and pathological conditions which obtain in abdominal aneurism that there are many fallacies and unavoidable sources of danger in abdominal aneurism which distinctly preclude the possible success of the method in a large proportion of the cases, no matter how perfectly the technique may be carried out. The important question that at once presents itself is, "Can these favorable and unfavorable conditions be clearly differentiated by the means of investigation now at our command?" A moment's reflection upon the clinical conditions that exist at the time when the majority of these patients seek relief will convince us that, notwithstanding all the advantages of an exploratory laparotomy, many of the essential points in the diagnosis, such as the exact origin of the aneurism, the part of the aorta in which the aneurismal orifice is situated, the size of the orifice, the relation of important visceral branches to the sac, the condition of the walls of the sac, etc., must remain unknown. In other words, with all the improvements that have been made in the technique and the exact knowledge obtained of the capabilities of the method when applied experimentally *in vitro*, we really know nothing positively of what this procedure will accomplish on the living subject except, perhaps, the empirical and gross fact that the method has been instrumental in saving the lives of three out of fifteen recorded cases of abdominal aneurism.

Notwithstanding this discouraging conclusion we must recognize that in so intractable a condition as abdominal aneurism, even so small a percentage of recoveries must not be disregarded; but, while still clinging to the method, it is also evident that it is not universally applicable and that it

is much less justifiable in some cases than in others. Under these circumstances some effort should be made to define the indications for or against this operation in this class of cases.

In attempting to establish the limitations of the Moore-Corradi method let us first briefly consider the conditions that are usually met in practice. It is of prime importance that we should first recognize that the cure of aneurism does not rest solely upon the successful coagulation of the blood or the arrest of the blood-current in the sac. Such a result, it is true, may mean the cure of the aneurism itself; but, in abdominal aneurism, the result, even when most successfully obtained, may precipitate an untimely end and the patient may die *because his aneurism is cured.* This conclusion, paradoxical as it may seem, will be readily understood when we reflect that some of the most important visceral arteries—*e. g.*, those given by the cœliac axis, the superior and inferior mesenteric branches, and the renals—often take their origin from the aneurismal portion of the artery. Hence, it is obvious that if the circulation in the sac is arrested and the openings leading into these branches are blocked by the aneurismal thrombus, the viscera supplied by them—in view of the absence of a sufficient collateral supply—will necessarily starve and undergo fatal necrotic changes. That this is not an idle or theoretical fear is well and abundantly shown by the fatal results of thrombosis caused by other non-aneurismal conditions in which the intestinal arterial supply is blocked by thrombosis of the mesenteric vessels. A few reported cases of abdominal aneurism in which this fatal form of mortification has been brought about by the sudden obstruction of the large visceral branches given off from the aneurismal sac will suffice for illustrative purposes. The case reported by Lunn and Benham in the *Medico-Chirurgical Transactions*, London, 1885, vol. lxviii. (*British Medical Journal*, April 18, 1885, vol. i. p. 783), is particularly interesting.

An abdominal aortic aneurism in a male patient, aged thirty

years, could be felt in the epigastric region. The dimensions of the tumor were six to seven inches from side to side and five to six inches from above downward, and extended antero-posteriorly from the vertebral column to the anterior abdominal wall. On October 31st distal compression was applied to the aorta with Corte's compressor for four hours and three-quarters, under chloroform and ether alternately. The following morning all the physical signs of aneurism were less marked. The tumor was smaller, harder, and pulsation less marked. The patient continued to improve for seven days. On the eighth day, however, persistent vomiting set in, and on the twelfth day he died, with marked peritoneal symptoms. *At the necropsy the aneurism was found to be cured, but there was gangrene of two feet of the jejunum.* The superior mesenteric artery which originated in the sac was completely blocked. In the discussion that followed the report of this case, Mr. Bryant stated that he believed that in one of his cases of abdominal aneurism in which he had applied distal compression death had occurred from the same cause.

By inquiring into the records of the fifteen cases of abdominal aneurism treated by wiring and electrolysis, I find only a few which furnish clearly defined evidence bearing on this point, but these few are sufficiently significant when we consider that in many others death followed too quickly after the operation to exhibit this distinctive mode of termination.

In twelve fatal cases out of the total fifteen reported the causes of death are stated as follows: In Loreta's case death occurred on the ninety-second day, from rupture of the aorta below the coagulated and cured sac; Lange's patient died on the twelfth day after wiring, from pneumonia and exhaustion; the aneurism had partially ruptured before the operation and had remained active, and was uninfluenced by this procedure; Stevenson's patient (superior mesenteric artery involved) lived only twenty-seven hours after the operation, death being caused by direct hemorrhage following the operation; Stewart's abdomino-thoracic case (No. I.) was fatal in nine days, from rupture of the sac; Stewart's second abdominal case termi-

nated fatally on the fifth day, from hemorrhage and other complications resulting from perforation of the aorta with wire; Parham's patient died forty-five days after the operation, from exhaustion, hemorrhage, and the effects of penetration of the wire into the thoracic aorta and left ventricle of the heart; Reeve's case ended in death twenty-four hours after the operation, from interference with the circulation caused by penetration of wire into the thoracic aorta up to the aortic valves; the author's patient died nineteen days after wiring and coagulation of the sac, from rupture of a secondary diverticulum or pouch in the sac, which yielded after the main cavity had been filled with clot. The remaining three fatal cases (Halsted's, Finney's first abdominal case, and Pringle-Morris) have points directly bearing upon the influence of the topography of the aneurism and the origin of visceral branches from the sac, in its relation to the prognosis of abdominal aneurism.

In Halsted's patient cœliotomy was performed and the tumor exposed; seventeen inches of No. 27 silver wire were first introduced and a galvanic current applied for twelve minutes; then a larger canula was introduced, and thirty-eight inches of No. 25 silver wire were also introduced; to this the anode of a galvanic current was applied and a current of varying strength from 30 to 100 milliampères was passed and continued for one hour and twenty-five minutes. The patient lived forty hours after the operation, and died with symptoms of sudden internal hemorrhage. The autopsy showed that a tumor extended from the diaphragm to the renal veins. An opening was formed in the dome of the sac leading into the pleura, which contained an immense quantity of blood. The aneurismal opening leading to the aorta was very large—almost as large as the vertical diameter of the sac itself. "The chief abdominal vessels were found to arise from the lower portion of the sac, the cœliac axis and superior mesenteric coming off within the sac, while the renal arteries sprang from the dilated aorta just at the mouth of the sac." In this case, as Dr. Hunner remarks, "when we

consider the position of the origin of the cœliac and superior mesenteric vessels from the wall of the sac there can be no doubt that the patient's death would have been even more precipitous had there been a formation of an obliterating clot during the operation."

Finney's first abdominal case is also instructive on this point. This patient died on the twentieth day, from hemorrhage and exhaustion. Five feet of silver wire was passed through a fine insulated aspirator needle. The wire was alloyed with 0.0075 of copper and drawn from No. 8 to No. 27. The galvanic current was begun at 30 milliampères and increased 10 milliampères each five minutes until 70 milliampères was reached, where the current was kept one hour. The effect upon the tumor was marked. The thrill ceased, no expansile pulsation could be determined, the sac was firm and decidedly smaller. After closing the abdomen nothing but a communicated pulsation, as of a solid tumor lying on the aorta, could be made out. The success of the operation seemed assured; but, from his recovery from ether, the patient complained of excruciating pain which increased until, within a few days, morphine was being given in one-quarter grain doses every two or four hours. Pulsation in the sac returned on the fifth day and continued to increase until death. On the nineteenth day there was bleeding of about 300 c.c. of bright red blood in the wound. He died on the twentieth day, seven hours after the hemorrhage from the external wound.

At the autopsy upon dissecting the aneurism it was found, among other very interesting conditions, that the cœliac axis originated from the upper border of the sac. It was also found that the aneurismal orifice corresponded with the origin of the superior mesenteric artery, of which artery the aneurism was a dilatation. It was evident that the wire had entered this portion of the sac and that blood had coagulated within the sac and almost filled it with solid antemortem clot. In connection with this involvement of the superior mesenteric and cœliac axis it is interesting to note

that at about the transverse portion of the duodenum there was an irregular area measuring 4.5 by 6.5 cms., over which the mucosa was exceedingly hemorrhagic and partially necrotic. The jejunum, as well as the duodenum and upper portion of the ileum, was of a dead chocolate color, and on being opened these were found to contain considerable bloody fluid. In the light of these post-mortem findings it would appear that in this one, as in Dr. Halsted's, the almost complete obliteration of the aneurismal portion of the superior mesentery was largely responsible for the necrosis of the bowel.

In Pringle and Morris' case, in which death took place on the fifth day from traumatic delirium and asthenia, the post-mortem findings explain to us how it happens that in some cases of aortic aneurism which involve the cœliac axis recovery is possible after coagulation and obliteration of the sac without bad consequences as regards the visceral and intestinal circulation. In the necropsy of this patient the aneurism, which was seated in the cœliac area, was undergoing coagulation and was apparently in process of cure. It was noticeable, however, that the opening leading into the sac was situated in the posterior and lateral wall of the artery opposite the origin of the cœliac axis. This sufficiently accounts for the absence of untoward results, as it was possible, under these conditions, for the aneurism to consolidate without affecting the circulation in the cœliac branches.

Stevenson's patient, in whom the aneurism was found at the necropsy to have involved the superior mesenteric artery, would, no doubt, have shared the same fate had he survived longer from the effects of the hemorrhage from the puncture. The patient died twenty-four hours after the introduction of two yards of "the finest steel wire."

In the three cured cases (Morse, Langton, and Noble) the evidence bearing upon the exact relationship of the important visceral branches to the sac is, for obvious reasons, difficult to determine with any degree of accuracy, and consequently is not specified. In Morse's case no information can be obtained as to the exact location of the tumor except that

it occupied the upper epigastric region; therefore, presumably the cœliac area was involved. In Langton's case, it is distinctly stated that the aneurism was situated in the *front* of the aorta *below* the superior mesenteric artery. Consequently, it was situated in the second division of the aorta, which would account for the success of intervention. In Noble's case it is stated that the sac was adherent to the lower border of the stomach and to the transverse colon, and this would suggest, with other facts, that the tumor originated below the cœliac axis and the superior mesenteric artery. The comparatively low origin in these two cases would therefore tend to bear out the conclusion that *aneurisms which originate low down on the abdominal aortic tract, especially below the superior mesenteric, all other conditions being equal, are much more favorable for attack by this method than those seated higher up in the cœliac area.*

In accordance with these facts we may classify the sacculated aneurisms of the aorta into three categories. The first group includes all the aneurisms which originate in the infra-diaphragmatic portions of the aorta, extending from the diaphragm to and including the origin of the renal arteries; this is the most important division of the artery, because it gives birth to the cœliac axis, with its gastric, hepatic and splenic branches, the superior mesenteric and renal arteries. It is the most important section of the abdominal aorta because it is the most frequent seat of aneurism. Lebert demonstrated long ago that 50 per cent. of abdominal aneurisms originated in this part of the aortic tract—(fifty-two out of ninety-two cases). It is also unfortunate that this division of the artery is comparatively short—scarcely more than two to three inches, the entire length of the abdominal aorta from the diaphragm to the bifurcation being only fifteen cms., or about six inches. Therefore it is almost impossible for an aneurism to develop in any part of this division without involving the origin of one of these all-important visceral branches; unless, as in Pringle and Morris' case, which must be a very

rare occurrence, the aneurism begins in the posterior or lateral aspects of the aortic circumference. Consequently, from the prognostic point of view, aneurisms of the first or cœliac division are of the gravest and most forbidding character.

The second division extends from the origin of the renals to and including the origin of the inferior mesenteric; this division includes only one vessel of great importance, the inferior mesenteric, but as this anastomoses very freely with the superior mesenteric and the inferior hemorrhoidal, it is probable that the occlusion of the vessel at its origin would not be followed by gangrene of the colon to which it is distributed; aneurisms in this division are much less frequent, but should they originate here their prognosis is better than in the first division.

The third division of the abdominal aorta extends from the inferior mesenteric to the bifurcation of the aorta. It is the longest division of the artery, and as it gives birth to no branches of visceral importance (lumbar and sacra media), it is the safest of all the divisions in a topographic and prognostic sense. Aneurisms here are most infrequent, unfortunately, and for this reason the comparatively favorable peculiarity of the artery at this level are of little help practically except in the very few cases in which aneurisms originate within its boundaries.

It is also most unfortunate for both surgeon and patient that a knowledge of these divisions, which are of great pathological interest, is of little avail practically, because it is impossible for the operator to determine with any degree of precision the exact site of the aneurismal orifice, no matter how freely he may explore the abdomen. The tumor in all cases overlaps the point of origin of the sac, the peritoneal investment and overlying viscera, which are usually adherent to the sac, make all efforts at precise exploration futile and impracticable. It is therefore only by approximation and guessing that the relative position of the aneurismal sac can be made out or even suspected.

In view of our powerlessness to make an accurate diagnosis of the site of the aneurismal orifice, and also of the practical certainty that all aneurisms involving the first or cœliac portion of the abdominal aorta involve one or more visceral branches of vital importance; and in view, also, that 50 per cent. of the aneurisms of the abdominal aortic tract are seated in this division of the artery, we must conclude that in all such cases it will be wise to abstain from attacking such aneurisms by the Moore-Corradi or any other method which aims at cure by coagulation. While it is not denied that an occasional cure can be effected even in aneurisms of the cœliac region by this method, it is evident that a favorable termination will be the result of a happy chance, a mere accident due probably to posterior position of the orifice of the sac, which is extremely rare and which the surgeon has no logical or reasonable means of recognizing or anticipating.

If we eliminate the aneurisms of the upper or cœliac division of the aorta as distinctly unfavorable to the mode of treatment under discussion, we will find its field of application restricted to a very small number of selected cases in the middle and lower divisions of the aortic tract; but even in these, when the anatomical objections are removed, there are other serious dangers to be considered which must imperil the life of the patient and militate against the success of the operation.

Foremost among these dangers is the possible rupture of the sac in multilocular aneurisms from unequal distribution of the clot during the process of coagulation. The danger is well illustrated in the writer's case, in which, after apparently arresting the circulation in the main sac, a secondary diverticulum developed rapidly a few days after the operation, leading to its final and fatal rupture on the nineteenth day.

That this accident will occur in spite of a good technique, applied under the most favorable conditions and after the success of the operation has been apparently secured, is amply

demonstrated by the several well-recorded thoracic and abdominal cases.[1]

Another unavoidable but rare accident is that which results from extension and detachment of clot from the aneurismal orifice into the main trunk, leading to embolism and thrombosis of the aorta, with gangrene of the lower extremities. This possibility is well shown in a case reported by H. Morris to the Medico-Chirurgical Society of London, April 14, 1885 (*British Medical Journal*, 1885, vol. i., p. 784), in which an aneurism of the subdiaphragmatic portion of the aorta had undergone spontaneous cure, with the formation of a clot which extended to the bifurcation of the artery, blocking up the iliacs.

Another danger inherent to the wiring process is the escape of the wire through a large aneurismal orifice into the aorta, from which it may sometimes migrate to the heart itself. This accident is likely to occur whenever the orifice of the sac communicating with the artery is large. It necessarily follows in all cases in which a fusiform aneurism is mistaken for a sacciform formation. In the latter case it is avoidable, at least in abdominal cases, but as no one can positively diagnosticate the size of the aneurismal orifice, *intra vitam*, it is evident that such accident is unavoidable when the conditions favoring its occurrence exist.

The following case, kindly communicated to me by our Fellow, Dr. F. W. Parham, is worthy of special attention in this connection. The operation was performed in 1896 in the Charity Hospital of New Orleans, and I copy the observation in full as written by Dr. Parham:

[1] Dr. Hunner in his paper, loc. cit., p. 276, calls attention to this grave danger in the following paragraph:

"One of the greatest dangers in this procedure, particularly in the large multilocular aneurisms, is the development and rupture of a secondary sac due to the rapid filling of the main sac by coagulum and the shunting of the blood-stream against a portion not receiving a special strain before. Apparently this occurred in the cases of Donneville, Cayley, Ransohoff, Hulke, Barwell, and in Stewart's first case." [Thoracic cases.]

"Loreta's unique case of rupture of the aorta at its juncture with the base of the former aneurism was probably caused, as he suggests, by the lack of nutrition to the wall due to changes in the circulation brought about by contraction of the organizing sac. General arterio-sclerosis would weigh against the operation."

History of a case of abdominal aneurism; exposure of the sac by opening of the peritoneal cavity in the median line; introduction of twenty-six feet of fine steel wire through a canula; death in forty-five days; wire found extended along the abdominal and thoracic aorta even into the ventricle of the heart.—James B., white, male, aged forty-six years, was admitted into Ward 19, Charity Hospital, service of Dr. J. H. Bemiss, March 30, 1896. Patient was a man of very dissolute habits, being addicted to drinking immoderately for many years. At the age of nineteen years he contracted syphilis, which, he says, manifested itself in the form of eruptions at various times. There is no family history bearing upon his present disease.

In July, 1895, while pursuing his occupation as fireman, he felt suddenly an intense pain in the lumbar region of the back, which gradually extended until it spread across the back. For about two weeks this kept him from working, and when he did go back to work he attended to his work with great difficulty, feeling very weak and complaining often of dizziness. He lost weight, and after December, 1895, was compelled to give up his work. When admitted to the hospital he was able to lie comfortably only on the right side with his left leg drawn up. If he lies for any length of time on his back he suffers intense pain and he is almost unable to lie on the left side at all.

Physical examination by Dr. Bemiss showed lungs normal, as likewise the heart, except that the apex-beat was slightly displaced to the left. A distinct pulsation was observed, synchronous with the first sound of the heart, just below the ensiform cartilage, very close to the median line. Palpation shows marked thrill and expansion of the mass is made out. Auscultation reveals two distinct sounds at the site of pulsation, the first being very prolonged, the second shorter. Liver dulness was normal. The urine was not examined at this time.

The treatment pursued was potassium iodide in gradually increasing doses up to toleration in conjunction with sulphate of morphine when required to relieve pain.

He was admitted to my service [Dr. Parham's] on April 21st, the condition being practically unchanged. The medical treatment having failed, he was admitted to the surgical service with the hope that surgical interference might accomplish something.

Accordingly, on April 23, 1896, under chloroform, I opened the abdomen in the middle line, the incision about five inches in length, lying entirely above the umbilicus. The sac was easily found and uncovered of overlying tissues. It was an aneurism of the abdominal aorta about the size of the fist, lying just above the umbilicus. A small trocar was inserted and the canula withdrawn. Some little difficulty was experienced in managing the canula, which was too short for the purpose, the adhesions preventing the tumor from being appreciably lifted from its bed. Some blood was lost from the canula, but a gauze pack being placed around it there was no further serious difficulty on this account. Very small steel wire, very resilient; so springy, indeed, that when it was once loosed from its spool it would fly off with a sudden jerk into space. About twenty-six feet were introduced in two sections.

The wound was only partially sutured, being left open, with gauze pack about the aneurism. He was returned to the ward very much depressed, but nothing striking had occurred during the operation.

For three days strychnine and digitalis were kept up at frequent intervals, with an occasional dose of morphine to relieve severe pain, of which he complained. This pain was referred to the lower region of the thorax. After the third day no further stimulation was required, and the last dose of morphine was given on the fourth day. The diet consisted of hot water in small quantities until the afternoon of the second day, when he was allowed peptonized milk to which was added panopeptone on the next day. These were gradually increased in quantity. On May 5th pure milk was given, and this was alternated with panopeptone. May 11th he was allowed soft-boiled eggs and soda cracker. After this

he seemed to be doing well, and only occasional notes are recorded.

Later I find the following notes in the clinical record:

May 14*th*. Complains of slight pain in the lower part of chest, left side; is very restless.

15*th*. Rested well, but sleeps very little.

June 5*th*. Suffering from slight pain in lower part of chest and upper region of abdomen; nauseated. The pain passed off during the afternoon.

6*th*, P.M. Feels very well, but complains of a pressure in the chest and cannot bear the weight of any cover.

7*th*, A.M. Passed a very good night, sleeping a little, but complains of nausea and of pain in both sides; feels very much depressed. 9 A.M. Vomited; taken with a violent pain in the centre of thorax, over region of the heart. At 9.45 A.M. tried to get out of bed, and while being restrained fell into collapse, losing consciousness, covered with a cold perspiration; pulse very weak. 10.30 A.M. Resting and seems better; vomited. 12.50 P.M. Taken with a severe pain; again collapsed, with loss of consciousness.

He died June 7, 1896.

The temperature and pulse records are of especial interest, and are here appended for study in connection with the post-mortem findings.

TEMPERATURE AND PULSE RECORD.

April 23, 1896, returned from the operating-room at 12.45 P.M.

	Hour.	Temperature.	Pulse.	Respiration.
April 23	1 P.M.	$99^2/_5$°	80	...
" 23	5 P.M.	$100^3/_5$	100	...
" 24	8 A.M.	$102^2/_5$	123	33
" 24	5 P.M.	101	...	30
" 25	5 A.M.	101	106	22
" 25	1 P.M.	100	107	26
" 25	5 P.M.	$99^3/_5$	93	23
" 26	5 A.M.	$99^2/_5$	80	20
" 26	5 P.M.	99	80	19
" 27	8 A.M.	98	79	18
" 30	6 A.M.	98	80	18
May 2	6 P.M.	98	70	18

Findings at the Autopsy. The abdominal wound had completely healed, the site of the operation being marked by cicatrix. There was some difficulty in reaching the cavity owing to the adhesions. The parts about the wound were firmly matted together, but there was no evidence anywhere of pus. The liver was adherent to the abdominal wall at the median line; on its convex surface a bloody serum was observed. There was œdema about the aneurismal sac, and there was extravasation in the omentum. Some clots were found in the pelvic cavity, but nowhere below the level of the umbilicus was there any sign of any inflammatory exudate. On the superior wall of the stomach was a large adherent clot. The pancreas was adherent to the duodenum. There was a general matting together of the tissues in the neighborhood of the aneurismal sac. There was no hemorrhage in the pleural cavity. The organs weighed as follows:

Kidneys, left, 6½ ounces; right, 5¼ ounces.

Spleen, 9½ ounces; liver, 3 pounds, 1 ounce.

Lungs, left, 9½ ounces; right, 10½ ounces.

The aneurismal sac was of the size of the fist and apparently as soft as at the time of the operation. The wire could plainly be felt coiled in the sac, but, strange to say, it could be traced up the aorta throughout its whole length until some of the strands could be found entering the heart itself, where some could actually be seen in the ventricle of the heart. The aneurismal opening situated in the anterior aortic wall opposite the seat of puncture was large enough to admit the tip of the index finger. A point of wire could be felt protruding through the wall of the descending aorta just below the arch. There was also a solution of continuity of the wall of the sac at its lower part to the left and slightly behind. The wire had apparently undergone no change in the sac, and the aneurism was not visibly affected by its presence. The aorta where the wire came through seemed practically unchanged, and the impression was that it had only recently pushed its way through. The wire in the heart also seemed to have caused little disturbance. The specimen was not

more closely examined at this time, but was removed for further study and was subsequently exhibited before the Orleans Parish Medical Society. I thought at first that the wire might have been pushed up in the manipulations of the autopsy, but careful examination did not confirm this suspicion, and the general opinion of those present was that the migration of the wire was entirely ante-mortem. Unfortunately, the specimen was subsequently lost by decomposition, and the more minute changes could not be further investigated.

Dr. Parham's case is certainly very remarkable in this respect: The long survival (forty-five days after the migration of the sac into the aorta and heart), and in spite of the actual perforation of the aorta in one place, is certainly a revelation. It is still a question, however, whether the wire actually migrated out of the sac into the aorta and ventricle at the time of the operation or whether this happened subsequently; and that death only occurred later when, owing to the elastic spring of the steel wire, it escaped out of the aneurismal orifice and suddenly reached the heart. The fact that the aorta was practically unchanged and that there was no thrombus, supports the impression produced at the time that the wire had only pushed its way through shortly before death. Whatever the interpretation of this occurrence, this case is another most striking illustration of the remarkable tolerance of foreign bodies by the aorta as well as the dangers of the method. Of the other cases in which this migration of wire out of the sac has occurred, only two (Reeve's and Stewart's) are abdominal cases, Ransohoff's and White and Gould's being thoracic. In Reeve's case (*vide* Appendix) a silver-plated, soft, copper wire, 0.016 inch in diameter, was used and seven feet introduced. As shown at the autopsy, the wire, irregularly twisted, occupied the centre of the sac; one end, together with a double loop of wire, passed up the aorta, the looped part reaching about ten inches, and the single strand quite up to the aortic valves of the heart,

where it left a spot of ecchymosis. Yet in this case, as in Parham's, the conditions were the best calculated to prevent such an accident, as the aneurism was distinctly sacculated, "the opening from the aorta into the sac being not over one inch in diameter."

In Stewart's case "fine silver wire (ten feet) was used. It was passed into a sacciform aneurism and thence into the dilated aorta." In Ransohoff's case (aneurism of ascending arch) eight feet of flexible wire were passed through a canula. Nearly fatal syncope occurred after the introduction of the first four feet.

At the autopsy (one month after operation) it was found that one loop had passed through the aortic opening and rested just above and in close contact with one of the lunulæ of the aortic valves.

It is evident from the occurrence of this very serious accident in at least three out of fifteen reported abdominal cases (20 per cent.) that it is not an insignificant element of danger, no matter how much the use of fine, properly drawn and snarled silver wire may have diminished this danger, which is especially inherent to coiled steel wire.[1]

Rupture of the sac by penetration of its walls with a stiff wire is another accident which is recorded; rupture of a thin sac by overdistension with too much and too stiff wire has been the cause of failure in a few instances; this can be usually avoided by following Stewart's instructions and not wiring more than ten feet of very fine, highly drawn wire. There is a risk of cauterization and ulceration of the sac by applying too strong a galvanic current, and, finally, there is the risk of sepsis and shock, which are less likely to occur if the operation is performed in two sittings, as in the writer's case.

[1] Hunner, in referring to this dangerous migration of the wire, speaks also of White and Gould's case of fusiform aneurism of the ascending arch in which the wire (22 feet of fine steel wire) escaped out of a more superficial saccular aneurism into a second fusiform dilatation of the aorta. The great danger of the escape of wire from an external saccular secondary aneurism through a large opening into a primary fusiform aneurism of the aorta is certainly not to be overlooked in thoracic aneurism.

To summarize, then, the objections to the Moore-Corradi method:

1. The cure of the aneurism may lead to the death of the patient by obliterating the orifice of important visceral arteries; this is most likely to occur in dealing with aneurisms of the upper or cœliac division of the abdominal aortic tract—*i. e.*, in about 50 per cent. of the cases.

2. Secondary rupture of the sac from the strain put upon weak portions of the sac in multilocular aneurisms, after partial coagulation of the contents has taken place (particularly likely to occur in subjects of general endarteritis with atheroma).

3. Escape of wire through a large aneurismal orifice into the lumen of the aorta, with migration upward into the heart leading to traumatic endarteritis, endocarditis, with the formation of secondary thrombi and emboli.

4. Danger of perforating the sac by stiff wire or by overcrowding the sac with too much wire.

5. Danger of extension of clot from the coagulum in the aneurism to the main artery, leading to fatal blockade at the bifurcation, with gagrene of the lower extremities.

6. Danger of rupture of sac from sudden withdrawal of abdominal support and displacement of adherent organs in the course of the exploratory laparotomy.

7. Danger of mistaking a fusiform for a sacciform aneurism.

8. Danger from emboli and thrombi following incomplete coagulation of the blood in the sac (a very rare and practically unknown occurrence in abdominal cases).

9. Danger of shock.

10. Danger of sepsis.

In the presence of this formidable array of dangers which beset the application of this method we ask ourselves what are the conditions, if any, which are favorable to its successful application? Theoretically possible, but clinically rare, are the following conditions: 1. The aneurism should be saccular. 2. It should be unilocular. 3. It should be provided with fairly strong, resisting walls. 4. The patient should

be young or middle aged, fairly healthy, and free from general endarteritis and atheroma. 5. The aneurismal orifice communicating the sac with the lumen of the parent artery should be small. 6. The aneurismal sac should spring from the lower, inframesenteric division of the artery, preferably between the origin of the superior mesenteric and the bifurcation. 7. If given off from the cœliac region the orifice should be situated on the posterior or lateral wall of the aorta.

With these ideal conditions, and with a perfect technique, the chances of permanent cure would be immensely increased and the operation could be undertaken with great probability, almost certainty, of success. But as the most important of these conditions can never be ascertained *intra vitam*, and we are thus unable to differentiate clinically between the favorable and the unfavorable cases, we are forced to conclude that the Moore-Corradi method as at present applied, and in spite of the undoubted improvements that have been made in its technique, is a most dangerous procedure, essentially lacking in the elements of that scientific precision and knowledge of avoidable perils which are necessary to elevate it out of the plane of empiricism and surgical experimentation. Its chief recommendation now rests upon the naked fact that in three out of fifteen recorded cases (20 per cent.) it has actually arrested the progress of aneurisms and saved life. Apart from this clinical fact, it can claim but little else in its favor except that in the presence of almost certain death from the disease when allowed to follow its natural evolution, even a remote possibility of survival by operation is better than no chance at all.

In studying this subject purely from the point of view of results we should bear in mind that the facts upon which we have based our conclusions are only those furnished by published cases, and that in this instance, as in so many others in medical literature, there are probably many failures with the method which are never recorded. It is more likely that the successful cases have found their way to the press, but

we doubt that this is true of the failures. Were all the cases published so as to make them available it is more than probable that the preponderance of fatalities would even be greater than is at present recorded.

Returning to the question with which we began our inquiry—viz., to what extent have the advances made in the purely technical phases of this procedure improved the patient's prospects of relief and his chances of survival?—we would say that, after analyzing this question from every point of view, we are compelled reluctantly to admit that little if any advantage has been gained in the statistical results. Thus we find that in 15 abdominal cases 7 were treated by wiring alone, and of these 2 recovered (Morse, Langton), or $28\frac{4}{7}$ per cent.; 8 were treated by the combined method of wiring and electrolysis (Moore-Corradi method), viz., Stewart, 2; Reeves, 1; Halsted, 1; Noble, 1; Matas, 1; Finney, 2. Of these only one was permanently cured (Noble), or 12.50 per cent. If we were to add Finney's second patient, who was subjectively improved and was probably living when the case was reported, we would have 25 per cent. of recoveries by this method, but in this case the aneurism was active when the patient was discharged.

In conclusion, I would state that in the light of present experience we should restrict our recommendation of the combined method to that small group of comparatively favorable cases in which the aneurisms are confined to the inframesenteric portion of the aorta, and then only after other safer methods of treatment had been tried and failed. In aneurisms situated in the upper part of the aortic tract, the boundaries of which cannot even be approximately determined, I would regard this procedure in the light of a pure experiment—a veritable surgical adventure—which would be justified solely by the imminent danger of death from rapid progress of the disease with threatened rupture of the sac, and associated with great suffering. Even then the operation could not be recommended, but should be undertaken solely at the urgent solicitation of the patient after a thorough

understanding that the chances would be no less than 70 per cent. against his recovery from the operation.[1]

APPENDIX.

SUMMARY OF 7 CASES OF ABDOMINAL ANEURISM TREATED BY THE INSERTION OF WIRE INTO THE ANEURISMAL SAC (MOORE'S METHOD), STATED IN CHRONOLOGICAL ORDER.

No. 1. *Name of Operator.* Professor Loreta, of Bologna.

Reference. British Medical Journal, 1885, vol. i., p. 745; *Memoirs of the Royal Academy of Sciences of the Institute of Bologna,* February 27, 1886.

Age and Sex. Male, aged thirty years.

Duration. First felt something give way in the belly while furling a sail, February, 1883. Tumor found October, 1884.

Size and Location. December, 1884, large, pulsating tumor in the epigastrium and left hypochondrium, with loud bruit, having its maximum of intensity in the epigastrium.

Operation. December 19th, through an incision reaching from the end of the sternum (that is, the root, not the tip of the ensiform cartilage) to the umbilicus. Numerous superficial adhesions were found and carefully separated; then more deeply situated adhesions came into view which united

[1] Dr. Hunner in his careful compilation of the reported cases (loc. cit.) by combining the statistics of the thoracic and abdominal cases, has collected 14 cases in which Moore's method of wiring alone was followed; of these 14 cases, 8 were thoracic and 6 abdominal. Two of these, abdominal cases, resulted in cure = 14 + per cent. of recoveries.

With the combined method (Moore-Corradi) there have been 23 cases: 17 thoracic and 6 abdominal. Four of these, or 17 per cent., recovered: 3 thoracic (Rosenstein, Stewart, Kerr) and 1 abdominal (Noble).

By combining the statistics of the two methods, and adding to Hunner's list 2 recent thoracic cases, 1 of which was cured and the other improved, reported by Freeman (Denver), and the 2 fatal abdominal cases reported in this paper (Parham and Matas), we make up a total of 41 cases of aortic aneurism thus treated, with 8 recoveries (2 abdominal and 6 thoracic), or $19\frac{21}{41}$ per cent. total recoveries.

Hunner also refers to 9 cases, or 39 per cent., in which there was an amelioration of symptoms and prolongation of life. He very properly cautions that "we must not be too sanguine on this point, for in any given case we cannot prophesy as to the patient's length of days or degree of suffering if there be no operative interference."

the sac to the stomach, omentum, transverse colon, and liver. Most of these were divided, but it was impossible to dissect the sac from the spleen, diaphragm, and cardiac end of the stomach; hence, it was impossible to trace the aneurism down to its mouth, nor could it be compressed or emptied. Therefore, it remained uncertain whether the aorta itself or one of its branches was the vessel involved. Believed to be the former. The tumor was punctured with a fine trocar, and silvered copper wire was passed in, in the direction of the current of the blood—that is, from above, on the right, downward and to the left. As soon as the wire experienced resistance the canula was removed, the end of the wire pushed in with a needle, and the puncture, together with the surrounding tissue, lightly cauterized with pure carbolic acid. About two metres (that is, a little over two yards) of wire had been introduced.

Immediate Results. Patient passed a good night after operation; diminished pulsation in aneurism. Pulse in femoral arteries, which had been suppressed, reappeared. The bruit also diminished in intensity and entirely disappeared January 10th, and in a month after operation tumor seemed quite consolidated and had diminished to one-quarter its former size and had no pulsation beyond the movement communicated to it by the artery on which it lay, and did not impinge on the parietes of either the thorax or the abdomen. The hypochondrium had resumed its normal shape.

Remote Effects. Patient left his bed on February 2d, and after remaining under observation for three weeks was discharged as cured. The whole period which had elapsed from date of operation to the publication of paper was seventy days. The patient died ninety-two days after the operation—that is, about three weeks after Professor Loreta's account of the case was published. His death was quite sudden, for he had been in excellent health for several weeks, and the tumor had become almost imperceptible to the touch. The cause of death was rupture of the aorta, just at the angle of junction between the artery and the lower wall of the tumor. The aneurismal

sac shrunk to the size of a walnut and was completely filled with coagula of organized fibrin. The copper wire was found unaltered and rolled up into a globular mass in the sac itself. Professor Loreta suggested that the compression and other changes produced in the artery by the coagula in the sac may have caused a failure in the blood-supply to the portion of the arterial wall immediately below the tumor, and may thus have induced the rupture of a portion of the artery, which was, no doubt, already diseased (*British Medical Journal*, May 9, 1885, p. 955).

No. 2. *Name of Operator.* F. Lange, New York.

Reference. *Medical News*, Philadelphia, 1886, vol. xlix., p. 582.

Sex and Age. Male, aged forty-five years. (Specimen presented.)

Duration. Not stated.

Location and Size. Aneurism enlarged very rapidly both in the epigastric and lumbar region about the right kidney.

Operation. A modification of Loreta's operation by passing a fine hollow needle through the abdominal wall and into the sac and introducing the wire was decided upon. First operation performed fourteen days before publication of the paper. A puncture was made in the epigastric and lumbar region, and three metres of thin wire were used. The patient did not need any anæsthetic and the operation caused no disturbance. The swelling in the epigastric region gradually diminished, and in the lumbar region it became harder; a few days later a swelling appeared near the liver; the needle was again inserted at that point and just above Poupart's ligament. A solution of chloride of sodium was then infused into the cephalic vein, the patient bearing it well, but yet the aneurism gradually increased. A second transfusion five days later caused slight improvement, but all further attempts were desisted from, the patient dying of pneumonia and exhaustion twelve days after first operation.

Post-mortem showed the viscera so much displaced that the right kidney was pushed forward and lay near the edge of the liver at the ascending transverse part of the colon, while the stomach was somewhat dislocated to the left side; there was no trace of puncture in the epigastric region or in any of the interlying organs; probably the puncture had been made through the left lobe of the liver and into the sac. On the left side, between the layers of the mesocolon, the abdomen was filled with blood, but the principal mass was on the right side, where there was a gallon or more. The aorta showed extensive atheromatous degeneration. The aneurism was located immediately below the diaphragm and communicated with the aorta by a lengthy opening through the posterior side of the vessel; there was also erosion of the twelfth dorsal and first and second lumbar vertebræ; the walls of the sac were quite firm from organized fibrin, the sac was as large as two fists and was ruptured on its right side, the silver wire being distinctly shown as it had entered into the cavities, presenting in one case distinct coagulation which had taken place around the substance; but in the other sac in which the wires had been introduced the wires were quite clean; the punctures were made at three different points, as above stated, but by all appearances two wires entered the same cavity. Dr. Lange did not think that coagulation was bound to occur, and he could not say whether the immense lot found in the original sac was produced by the wires or not; but where previously there had been a strong pulsation, two days before death that pulsation was hardly perceptible and the bruit had disappeared. He thinks that if the case had been taken earlier rupture of the sac could have been prevented and a cure effected even in this severe case. About thirty feet of wire had been used.

No. 3. *Name of Operator.* John F. Morse.

Reference. Pacific Medical and Surgical Journal, February, 1887; *Medical News,* Philadelphia, 1887, vol. l., p. 264.

Age and Sex. Male, aged thirty-two years.

Duration. March 4, 1886, patient was struck violently in the abdomen by a coal-bucket; a week later he began to suffer from vomiting and constipation, accompanied by intense pain in back, side, and abdomen, and noticed a pulsating swelling in abdomen; confined to bed one month. Treatment for three weeks—rest, diet, doses of potassium iodide; much improved; left hospital and worked three months; tumor increased in size.

Operation. November 17, 1886, incision four inches long was made over tumor through the linea alba. On opening the abdominal cavity the intestines were withdrawn and covered with warm cloths.

Size. Aneurism was exposed and found to be the size of both fists. An exploring needle one millimetre in calibre was thrust into the sac, when a stream of arterial blood spurted through it. One yard and a half of one-half millimetre silver-plated copper wire was carefully passed through the needle into the aneurism and the needle withdrawn. The slight hemorrhage resulting was readily stopped by touching the small opening with pure carbolic acid and glycerin. Wound closed with five deep and four superficial stitches.

Immediate Result. Patient suffered from vomiting for several days. Day following operation pulsation in both femorals was scarcely perceptible, but soon appeared again. One week after operation dressing removed and stitches taken out; wound healed; pulsation over tumor very slight.

Remote Result. On 26th patient complained of pain in left groin; left leg swollen, œdematous, and cold; no pulsation felt in left femoral; in right femoral very feeble. Leg wrapped in cotton and warm bottles applied. In two or three days swelling disappeared, pulsation in left femoral not reappearing. January 7th, patient about to leave hospital. Pulsation in tumor again diminished. Tumor, reduced one-half size at time of operation, consists of a hard nodule; no bruit; scarcely any difference in pulsation of femorals.

Remarks. This, the first successful case of the kind, proves

the feasibility of Loreta's method of treating aneurisms of the abdominal aorta.

No. 4. *Name of Operators.* J. J. Pringle and Henry Morris.

Reference. British Medical Journal, 1887, vol. i., p. 828.

Age and Sex. Male, aged forty-six years.

Size and Location. Aneurism arising from upper part of the abdominal aorta. Treatment for a month by rest, diet, morphine, etc.

Operation—Performed by Henry Morris. Principal difficulties encountered were: (1) The introduction of the wire, which was coiled on a roller, into the canula necessarily held deep in the abdomen; (2) the adjustment of the canula between the outward force of the pulsation and the inward force of pressing the wire into sac. Operation consisted of laparotomy and the introduction of steel wire into the sac; only about one foot of wire was introduced before an insurmountable kink stopped its further progress. No hemorrhage of importance complicated the operation.

Immediate Result. For two days patient progressed satisfactorily, but he subsequently became almost maniacal, and died of asthenia.

Result. Death five days after operation. Highest recorded temperature, 100.6° F.

Necropsy. Both sides of heart distended by mixed clot; no peritonitis beyond narrow line of adhesion between the operation-wound in the parietal peritoneum and the subjacent viscera. Aneurism was found to arise from the aorta at the level of the cœliac axis and to be very saccular and filled with clot, more than one-third of which was laminated and presumably due to the procedure adopted.

No. 5. *Name of Operator.* W. F. Stevenson.

Reference. Lancet, 1895, vol. i., p. 22, 1 pl.

Sex and Age. Male, aged twenty-five years.

Duration. First pains in back and legs were felt in Octo-

ber, 1892. Tumor first discovered in June; small and situated to the left of umbilicus.

Location and Size. In September a tumor having all the characteristics of an aneurism was situated about two inches below the left costal margin and about three inches to the left of the middle line as the man lay on his back. It was about the size of a large orange and quite globular in shape. Judging from its mobility, it was evident that the aneurism *was not on the aorta*, and from its situation it was considered probable that it was either on a branch of the cœliac axis or on the superior mesenteric artery.

Operation. An incision was made in the median line from one inch and a half below the ensiform cartilage to within an inch of the umbilicus, but which was afterward prolonged to the umbilicus. After the colon and omentum had been pushed upward off of the tumor it still appeared to be covered by more than one layer of peritoneum; these were torn through by means of two pairs of dissecting forceps, and an area of the tumor about the size of a shilling was laid bare, showing a grayish-blue surface. At this point a very fine trocar and canula were passed in at right angles to the long axis of the tumor for about two and a half inches. Hemorrhage immediately occurred alongside the canula and continued freely during the whole time the wire was being passed in (about five minutes). The wire was the finest steel wire, and it had been tightly coiled on a small reel so as to insure its coiling up within the sac. It was passed through the canula by means of a small pair of pliers, the wire being held by the pliers at about an inch from the end of the canula, and in this way it was introduced inch by inch. *Two yards were* thus disposed of. When the outer end of the wire came flush with the end of the canula it was pushed onward and free into the sac by means of a knitting-needle which had previously been filed down so as to fit the canula. Wound closed by two rows of sutures. Operation lasted one hour and a half.

Immediate Results. Severe hemorrhage occurred at 7 P.M.;

wound was not reopened. Patient died at 1 P.M. the following day. He had lived twenty-seven hours after operation.

Post-mortem. The aneurism was found to be on the *superior mesenteric artery.* It was fusiform in shape, about six inches long, three and a half inches in diameter at the base and somewhat less at the outer end. The aorta in its whole length showed numerous patches of atheroma.

No. 6. Operated by F. W. Parham, New Orleans, La., April 23, 1896. (See text.)

No. 7. *Name of Operator.* John Langton.

Reference. Clinical Society Transactions, London, 1899, vol. xxxii., p. 136.

Age and Sex. Female, aged thirty-five years, married.

Duration. October, 1896, patient was delivered of a stillborn male child after a difficult and tedious labor; twenty hours afterward she was suddenly seized with severe abdominal pain, and next day noticed a small, throbbing lump; tumor larger than it was three months ago. Admitted to hospital March 29, 1897.

Location and Size. In the epigastric region, midway between the ensiform cartilage and the umbilicus, is a tumor which rises at its greatest convexity the superjacent abdominal walls. The swelling pulsates visibly. Circular in outline, it has a vertical diameter of three and a half inches and a transverse diameter of two and a half inches. After three days' medical treatment patient left the hospital, being dissatisfied with treatment. She returned one week later, looking much worse; tumor now the size of a small Jaffa orange.

Operation April 12th. Laparotomy. Incision three and a half inches long in the mid-abdominal line, ending an inch above the umbilicus. On opening the peritoneal cavity a large pulsating tumor was discovered, three inches in diameter. It proved to be an aneurism of the front of the aorta below the superior mesenteric artery. The sac was found to be harder and less expansile in the upper than in the lower

half. A small trocar and canula were passed into the sac and then the trocar was withdrawn. About twelve inches of thin salmon fishing gut were introduced into the sac through the canula; difficulty was found in pushing the extreme end of the salmon-gut into the sac by means of the second length of gut. The second piece of gut was consequently withdrawn and five feet of fine silver wire introduced. To insure the complete entrance of the end of the silver wire into the sac the canula, with its contained wire, was withdrawn and then the sac was firmly pressed with the blades of a pair of scissors before cutting through the wire, so that on the pressure being removed the sac closed over the wire end. The opening in the sac through which the wire had been passed was then ligatured with fine sterilized silk. The hemorrhage was insignificant and presented no difficulty during operation. Operation lasted one and a half hours. The different abdominal walls were separately sutured with fine silk.

Immediate Results. Patient suffered from vomiting from 8.30 to 11.15 P.M.; given one-tenth grain morphine every two hours. Tumor, six days after operation, is situated entirely to the right of middle line; its inner part pulsates feebly, but is apparently solid and all bruit is absent. Close to the right costal arch it is slightly expansile, with a loud bruit. May 5th, careful examination made of tumor; only faintest bruit can be heard, and no thrill is felt. Probably due to this examination, patient vomited and had a rigor; temperature rose to 104° F. Pulsation in aneurism very marked; the systolic bruit very loud, and thrill can be distinctly felt over a considerable area. These symptoms yielded to treatment. May 7th, patient is materially improved; bruit and thrill in aneurism have almost disappeared. Her general condition is good, although pulse is still weak; left hospital next day.

Remote Results. Since dismissal from hospital the patient has presented herself from time to time. The sac has diminished to a small, hard mass, still to the right of middle line, but no pulsation or bruit. When the mass is pressed against

the aorta there is a fictitious forward pulsation, but it is not expansile. October, 1898, patient writes "she is enjoying good health and has little or no trouble from the lump."

SUMMARY OF 8 CASES OF ABDOMINAL ANEURISM TREATED BY INSERTION OF PERMANENT WIRE AND ELECTROLYSIS.

No. 1. *Name of Operator.* D. D. Stewart.

Reference. American Journal of the Medical Sciences, Philadelphia, 1892, N. S., vol. civ., p. 42.

Sex and Age. Male, aged thirty years.

Duration. First seen July, 1888; two years prior to this had developed a pain in back in consequence of attempting to carry a heavy load; several months before he was first seen he indulged in heavy wrestling, and immediately afterward, while seated, he felt something give way in former painful area. Shortly subsequent to this a small tumor appeared in the upper part of the left lumbar region.

Location and Size. Upper part of left lumbar region; diagnosis of abdominal aortic aneurism. Patient put under medical treatment for three months; dismissed improved; returned seven months later (May, 1889), little or no pain, tumor had not increased; seen four times up to October. Not seen again until two years later; physical condition much worse; the bulging posteriorly had reached a length of five and a half inches; its greatest breadth four and a half inches; there were three large nodules upon it. Bulging began opposite the spinous process of the ninth dorsal vertebra and extended to the lower lumbar spines.

Operation December 7th. A canulated steel needle two and a half inches long, of sufficient size to permit the passage of the wire insulated with shellac to within half an inch of its point, was used to pass the wire. Rather heavy silver wire was used, "drawn hard to No. 23, Brown and Sharp gauge." Wire and needles were sterilized by boiling in carbolated water; the hot water softened the insulation, which was subsequently hardened in cool air. The canulated needle carrying the wire was inserted to within half an inch of its hilt.

A platinum needle was also used, which was passed until it was thought that the insulated part was fully within the sac. Two and a half inches of wire were now slowly inserted, the distal end of the wire being first blunted by filing. The anode of a galvanic battery was now attached to the wire, and the current was gradually increased through the controller until 70 milliampères were reached, and was maintained at this strength for one hour. The negative (indifferent) electrode was a very large felt plate, which lay upon the right shoulder and scapula and was kept constantly moist with hot water. Notwithstanding this, much pain was felt at this point, and the current was momentarily opened and a large, folded, and thoroughly wet towel was placed beneath the plate; no pain after this. Pulse became quite feeble. Needle cautiously withdrawn, wire cut close to the skin and gently pushed beneath the latter after drawing the skin as a cover over the wire (the skin had been pushed to one side in introducing the needles, in order to form a valve-like opening). During the introduction of the canulated needle blood spurted on the needle entering the sac wall to about the depth of one-third or one-half of an inch. Hemorrhage ceased on passing wire into the canula; none occurred on withdrawing the needles. Their site of exit was sealed with cotton soaked in iodoform collodion. The condition of both needles showed unquestionable clot formation about them.

Immediate Results. A few hours subsequently the sac felt warmer than before, indicating inflammatory reaction, and pulsation seemed much less expansile. Considerable pain was felt in centre of left side of abdomen. Patient very restless, tossing about bed and even at times walking around room. Despite this, a remarkable change was noticed in condition of aneurism when examined on third day. The prominent pulsating portion through which the canulated needle had been passed had sunken to the level of the general aneurismal surface, and transmitted pulsation alone could be detected in it.

Remote Results. On ninth day after operation, after patient

had been tossing himself about on the bed and had been thumping his left side with his fist—a practice he was addicted to when in pain and which he insisted upon pursuing—he suddenly called for a cuspidor that he might spit, and almost immediately a gush of blood came from his mouth, and in a few seconds he was dead.

Necropsy eight hours after death. Former aneurism bulging had disappeared. The sac extended from a point about opposite the right nipple obliquely downward and to the left, across the bodies of the ninth, tenth, and eleventh dorsal vertebræ to the lower edge of the twelfth rib on the left, filling the hypochondrium and a part of the lumbar region. It was twelve inches in its oblique measurement, four inches in transverse diameter above on the right, and six inches below on the left. The aneurism had arisen from the posterior and left lateral wall of the lower thoracic aorta, and subsequently had involved a portion of the abdominal aorta. The sac contained about a quart of clot and some fluid blood. The wire lay in coils in the sac. The wire was engaged in several large, firm clots, which were of so solid a texture that when examined in that part of the sac which was removed they could be separated from sac and wire only with some difficulty.

No. 2. *Name of Operator.* Prof. W. S. Halsted, of Baltimore.

Reference. *Johns Hopkins Hospital Bulletin*, November, 1900, reported in Dr. G. L. Hunner's paper on "Aneurisms of the Aorta Treated by the Insertion of a Permanent Wire and Galvanism (Moore-Corradi) Method."

Sex and Age. Male, printer, aged twenty-seven years.

Duration. His present trouble dates since May or June of the year 1897 (seven months before operation), when he began having a "dull, dragged-out feeling" and occasionally sharp pains across the abdomen, which caused him to lie doubled across his printer's stool for the pressure benefit, etc.

Size and Location. Left epigastrium prominent; left costal margin over sixth or seventh cartilages is bulged slightly forward. Pulsation limited to upper half of the abdominal aorta, over which a globular expansible mass the size of a very large orange can be outlined. A purring, cystolic and diastolic thrill is felt over the mass.

Operation, November 24, 1897; laparotomy. A median incision is made from the ensiform to umbilicus, exposing a pulsating mass in the epigastrium, seemingly about a fist-size, lying behind a lesser peritoneal cavity. This could be reached only through the lesser omentum by pulling down to the stomach and approaching the sac above the lesser curvature. An area 1 by 2 centimetres was laid bare over the sac wall by blunt dissection through the posterior layer of the lesser peritoneal cavity and its underlying subserous fatty layer. The wall of the sac seemed very thin at this point. A distinct expansile pulsation and thrill were perceptible to the fingers. A hypodermic needle was inserted to test the thickness of the wall. A long aspirating needle of small calibre was inserted and an attempt made to pass a No. 27 wire (No. 5 piano gauge). This was of pure silver and undrawn, and had been rolled on a wood reel and boiled. After passing a few inches of the wire it kinked and both needle and wire were withdrawn. Bleeding followed, but was easily controlled by pressure of a finger. The needle was oiled and again inserted, and about seventeen inches of No. 27 wire were introduced, when it again kinked. The current was passed through this for twelve minutes. The needle was withdrawn, and the wire being cut off near the sac was pushed under the surface by catching it in the point of an aspirator needle. A third and longer aspirating needle was now inserted, and thirty inches of No. 25 wire (No. 4 piano) were passed through it with ease. Considerable bleeding took place from the lumen of the large needle, so it was withdrawn and the wire cut about a foot from the sac. Hemorrhage was controlled by slight pressure of a finger beside the wire at its site of entry. The galvanic current was then

passed, the anode being connected with the end of the wire and the cathode with a large metal plate wrapped with a towel and placed under the back. The electrolytic action was continued for one hour and twenty-five minutes, varying in strength from 30 to 100 milliampères. No appreciable change took place in the pulsation of the sac during the process. The wire was cut off close to the sac and the posterior peritoneum closed over the site of puncture with fine silk sutures.

Immediate Results. Pulse varied between 90 to 120 during operation. He lived about forty hours after operation and died with symptoms of sudden internal hemorrhage.

Necropsy. Aneurismal sac is collapsed; it lies behind the lesser peritoneal cavity to the left of the vertebral column, extending slightly beyond the right margin of the same. It extends from the diaphragm, to which it is firmly adherent, to the renal vein, which runs transversely over its lower anterior edge. On opening the aneurism and the aorta the aneurismal opening is found to have a vertical diameter of 8.5 cm., while that of the sac is but 10 cm. The chief abdominal vessels arise from the lower left portion of the sac; the cœliac axis and superior mesenteric coming off within the sac, while the renals spring from the dilated aorta just at the mouth of the sac. The left pleural cavity is found to contain an immense blood-clot, forming a complete mould of the cavity and weighing 1170 grains. In addition, 960 c.c. of fluid blood are removed. The diaphragm is seen to bulge considerably into the pleural cavity, and at the summit of the dome is a ragged, hemorrhagic area, the site of rupture. A little to one side of the perforation, which scarcely admits the tip of the little finger, lies a loop of the wire. "The walls of the sac are held apart by four or five coils of silver wire, which lie peripherally and near together, forming an ellipse whose plane is antero-posterior with reference to the body. These coils are covered by loose coagulum, which readily becomes detached on manipulation. Death from rupture of the very large, tense, thin-walled sac, with enormous mouth,

could not have long been delayed; but it is probable that it was hastened by the wire working against the sac wall. *Considering the position of origin of the cœliac and superior mesenteric vessels from the wall of the sac, there can be no doubt that the patient's death would have been even more precipitous had there been a formation of an obliterating clot during the operation.*"

No. 3. *Name of Operator.* D. D. Stewart, Philadelphia.

Reference. Philadelphia Medical Journal, November 12, 1898.

Age and Sex. Laborer, aged forty years; syphilitic, albuminuric.

Size and Location. Pulsating tumor in the left quadrant of abdomen.

Operation. Abdominal section performed by Drs. Deaver and Neilson, September 24, 1896, disclosed what appeared to be a saccular aneurism springing from the left of the aorta in the situation of the cœliac axis. Blood spurted on the introduction of a needle into the mass. Ten feet of coiled fine silver wire were introduced and a current of 50 milliampères was passed by the anode for half an hour.

Immediate Results. The operation was well borne and the patient did well until the fifth day, when, shortly after taking food, he was seized with a severe colic and dyspnœa, and suddenly died.

Necropsy. A tumor springing from the bodies of the vertebræ was found encircling the aorta. Nature of the tumor not stated. The aorta above the mass was much dilated, the dilatation extending from about opposite the cœliac axis to some distance into the thoracic aorta. A small saccular aneurism of what appeared to be the splenic artery existed. The wire had been originally passed through a part of the tumor into the small saccular aneurism and had thence extended into the dilated aorta. The site of rupture of the vessel that had caused the hemorrhage into the stomach could not be ascertained.

No. 4. *Name of Operator.* James C. Reeve, Dayton, O.

Reference. *Annals of Surgery*, Philadelphia, 1889, vol. xxx., p. 704.

Sex and Age. Male, aged forty-nine years.

Duration. Nine months before entering hospital tumor was first discovered. Diagnosed as aneurism two months prior to admission.

Location and Size. It was plainly visible as a dome-shaped swelling in the upper umbilical region, about 15 by 10 centimetres.

Operation. Under Schleich's anæsthesia a buttonhole incision through the linea alba just above the umbilicus was made. The tumor was overlaid by omentum, to which and to the intestine there were a few adhesions. An old, hollow perineum-needle, provided with a ratchet-wheel for delivering the wire through it, was introduced, and, being 0.031 inch in diameter, permitted considerable hemorrhage through it, but this soon ceased through clotting. Having no definite guide as to the character of the wire to be introduced (only an abstract of Dr. Hare's paper having reached our hands), silver-plated, soft copper wire, 0.016 inch in diameter, was used, and seven feet introduced before a hinderance occurred. The wire was now attached to the positive galvanic pole and the current gradually increased to 80 milliampères, at which it was kept for fifty minutes. Not much suffering was caused by the current except on one occasion, when it was advanced to 110 milliampères for a few moments. After fifty minutes, syncope was threatened, and the seance was discontinued. Distinct firmness of the tumor had occurred as well as a disappearance of the expansile pulsation, and the hollow needle encountered considerable resistance when it was moved from side to side, showing that the desired clotting had occurred. Bleeding was free for a short time after withdrawing the needle, but ceased when the incision was closed. Before the suturing was begun the end of the wire was buried as far as possible in the sac wall.

Result. Patient lived twenty-four hours, during which

time the pain was the same as before operation. Pulse was rapid and thready throughout and skin cold, but mind clear.

Pathologist's Report. An aneurism of the abdominal aorta, two inches above its bifurcation. A wire, irregularly twisted, occupied the centre of the sac, surrounded by and mixed with old and recent clot; one end, together with a double loop of wire, passed up the aorta, the looped part reaching about ten inches and the single strand quite up to the aortic valves of the heart, where it left a spot of ecchymosis. The aneurism was distinctly sacculated, the opening from the aorta into the sac being not over one inch in diameter.

[*Note.* Author made numerous experiments with various kinds of wire, and came to the following conclusions: A silver or gold wire, then, about 0.0085 inch in diameter and of sufficient temper to retain its coil, would seem to be all that is required to fill, when carrying the positive galvanic current, an aneurism with clots, and is not so thin as to be in danger of breaking. It is suggested that the easily obtained music wire previously mentioned be taken as a sample.]

No. 5. *Name of Operator.* Dr. J. M. T. Finney, Baltimore.

Reference. *Johns Hopkins Hospital Bulletin,* November, 1900, in Dr. Hunner's paper.

Age and Sex. Aged twenty-five years, male, book-keeper; excellent personal and family history.

Duration. From October, 1897, to August 27, 1898, when he was operated on, or eleven months; jaundice from compression four months before operation.

Size and Location. Pulsating tumor in the epigastrium. "One could outline a globular mass about as large as a medium-sized orange and from this get expansile pulsation. On auscultation a loud, amphoric, systolic murmur was heard, limited to tumor area."

Operation. During one month of treatment by absolute rest, restricted diet, and potassium iodide the aneurism continued to enlarge and the pain increased. On August 27th

Dr. Finney performed the Moore-Corradi operation. Under ether, a median incision from ensiform to umbilicus, exposing the lower border of liver and upper border of stomach. Between these lay the sac, almost completely hidden by a flattened-out pancreas. The sac seemed globular, about seven centimetres in diameter and apparently extended around the aorta, resting on the transverse processes of the vertebræ. The pancreas was separated with difficulty, and finally had to be divided in order to expose the sac. Beneath its upper border, and flattened out across the sac, was the splenic vein, about one centimetre in breadth. Puncture was made in the upper edge of the sac just above this vein, the needle pointing downward and as nearly parallel with the aorta as convenient. Five feet of silver wire were passed through this fine insulated aspirator needle. The wire was passed without particular difficulty by grasping it between the thumb and the first finger and passing very short portions at a time. Slight oozing through the needle made the fingers very slippy, and they had to be repeatedly rubbed with an alcohol sponge. The galvanic current was begun at 30 milliampères and increased 10 milliampères every five minutes until 70 milliampères was reached, where the current was kept one hour.

Immediate Results. After half an hour the thrill, very marked at the beginning, had disappeared. At the end of the electrical session there was no thrill; no expansile pulsation could be determined; the sac was firm and decidedly smaller. After closing the abdomen nothing but a communicated pulsation, as of a solid tumor lying over the aorta, could be made out.

Remote Effects. The success of the operation seemed assured; but, from his recovery from ether, the patient complained of excruciating pain, which increased until, within a few days, morphine was given in one-quarter grain doses every two to four hours Temperature on the day following the operation reached 102.5°, and on the third day 103.7°. Temperature supposed to be caused by necrosis of skin of back from contact with electrode. Marked suppuration in

wound recognized on seventh day; fever persisted, however. As to tumor, for the first four days no expansile pulsation could be made out; but on the fifth day it was distinct, and the sac from this time seemed to increase in size. On the sixteenth day nausea began, and from this time the patient was in extreme discomfort. On the nineteenth day there was bleeding of about 300 c.c. of bright red blood from the upper end of the granulating wound. The patient became very weak and pale, and it was evident that he was having internal hemorrhage. He died on the twentieth day, seven hours after the hemorrhage through the external wound.

Necropsy. Marked evidences of general arterio-sclerosis in heart and aorta. At the upper border of the tumor the cœliac axis could be dissected free with its three branches. On opening the aorta by cutting along its posterior wall, an opening $1\frac{1}{2}$ by $1\frac{3}{4}$ cm. in diameter could be seen on the anterior wall, leading into the aneurism. This was evidently the greatly dilated orifice of the superior mesenteric artery, of which artery the aneurism was a dilatation; 1 cm. above this opening was the orifice of the cœliac axis. The inferior mesenteric arose $3\frac{3}{4}$ cm. below. The renal arteries, one on either side, took origin on the lower margin of the opening. Near each renal orifice, immediately on the margin of the aneurismal orifice, was a blackened, slit-like sulcus in the arterial coatings. Although there was no wire in the mouth of the aneurism at the time of the autopsy, it appeared as though one loop had swung across the mouth, with its converse side in the aorta, thus burning the margin as described. (From this and from experiments upon free blood and upon dogs, Dr. Hunner concludes that a current of 70 milliampères is dangerous.) At about the transverse portion of the duodenum there was an irregular area, measuring about $4\frac{1}{2}$ by $6\frac{1}{2}$ cm., over which the mucosa was exceedingly hemorrhagic and partially necrotic. Just in this locality were found, in addition to the bloody fluid, several large, fresh clots. No definite opening into the sac could be found, and our conclusion was that very rapid oozing had taken place

through the greatly thinned walls of the adherent sac and bowel. In looking into the sac the wire could be seen embedded in a solid ante-mortem clot, which apparently almost filled the sac.

No. 6. *Name of Operator.* William H. Noble, Philadelphia.

Reference. *Philadelphia Medical Journal,* 1898, vol. i., p. 1203.

Sex and Age. Male, aged thirty-seven years.

Duration. Six months prior he first noticed a dull pain in the epigastric region, which was reflected through to the back. Four months after first pains he felt a pulsation in the stomach, and he began to lose flesh.

Location and Size. Tumor the size of a fœtal head, midway between the ensiform cartilage and the umbilicus. A diagnosis of aneurism of the abdominal aorta was made. Condition grew rapidly worse, and at the end of two weeks operation was performed.

Operation. Operation, July 14, 1897, was performed with the assistance of Dr. D. D. Stewart, who manipulated the wire after the canula was introduced. The needles were tipped with gold and insulated with celluloid. At 1.15 P.M., under ether, an incision extending from an inch below the ensiform cartilage nearly to the umbilicus was made through the abdominal wall. The transverse colon and the inferior border of the stomach were densely adherent to the tumor. A delay of fifteen minutes was experienced in separating and walling them off, in order to secure sufficient space to operate without danger from contact with the current; at 1.30 P.M. the needle was passed into the sac, the blood spurting several feet, but the escape ceased as soon as the wire was introduced. We succeeded, in the course of half an hour, in slowly introducing eight and a half feet of hard-drawn No. 30 gold wire. The end of the wire emerging from the sac was attached to the positive pole, and contact with the negative pole was secured by means of a large clay plate thor-

oughly wetted and placed under the buttocks. The current was started at 2.09 P.M., and in two and a half minutes was increased to 35 milliampères. When the current was started the patient's pulse was very feeble, but under the influence of the current it became stronger, increasing both in volume and in tension. The man had been given one-twentieth grain of strychnine and one-fiftieth grain of atropine. At the expiration of five and a half minutes the current had been increased to 40 milliampères, the pulse showing 156 beats per minute. After twelve minutes the current was further increased to 45 milliampères; one minute later to 50 milliampères, and in fifteen and a half minutes to 55 milliampères; at the expiration of twenty-one minutes to 60 milliampères, and in twenty-six minutes to 65 milliampères, where it was maintained two minutes, when it was increased to 70 milliampères and maintained at that point for six minutes. The patient now showed marked symptoms of failure; the current was therefore closed at the end of thirty-seven minutes. Ten minutes after the beginning of electrolysis pulsation was markedly lessened and continued to grow less throughout the seance, though it did not entirely cease. The needle was withdrawn without difficulty, leaving the wire broken off either on the inside of the sac or in its walls. There was no hemorrhage attending this procedure or following it. The patient's arms and legs were bandaged and the foot of the table elevated. Operation occupied two hours and ten minutes.

Result. No pain after second day, and improvement was rapid. Pulsation in stomach ceased entirely. He was kept in bed until September 11th, and when discharged, two weeks later, the mass had lessened to size of a small orange; no pain. Transmitted pulsation could still be felt, and there was also a slight thrill felt on palpation, but no return of pain. Went home in October, apparently well.

Remote Result. Patient was treated in March, 1898, eight months after operation, for necrosis of left side of lower jaw, and died March 30, 1898, not from aneurism,

nor did he have any trouble in that respect. No post-mortem made.

No. 7. *Name of Operator.* Dr. Finney, Baltimore.

Reference. Johns Hopkins Hospital Bulletin, November, 1900, Dr. Hunner's article, *loc. cit.*

Age and Sex. Male, sewing-machine agent, aged thirty years.

Duration. Ten months from date of first symptoms to operation. Family and personal history excellent; "nothing to arouse suspicion of arterial disease." Began with intermittent pain of a burning and gnawing character located in stomach region.

Size and Location. Six days after admission Dr. Osler noted that with deep palpation a definite expansile pulsation could be determined, and with deep pressure on the left side the sac could be felt.

Operation. Cœliotomy; passage of eight or nine feet of highly drawn sterling silver wire; galvanism for an hour at 10 milliampères. The conditions found in the previous case were almost duplicated in this instance. The pulsating mass was covered over by the lower portion of the stomach, over its upper portion to the pancreas and the large splenic vein traversed its convex surface. The procedure was the same as in Dr. Finney's first case, except that section of the very hemorrhagic pancreas was avoided by drawing the liver to the right and making the puncture in the right upper quadrant of the sac.

Immediate Results. The patient bore the operation well, his pulse ranging about 110 beats per minute. At the close of the electrical seance there was no appreciable difference in the pulsation of the sac. This fact, together with the anatomical relations of the mass, made it seem very probable that the aneurism was one of the superior mesenteric artery, as in Dr. Finney's first case. Except for middle-ear trouble, the patient's convalescence was uneventful. He was very happy over the marked improvement in his symptoms, insisting

that he must be getting well because of the slight amount of pain compared with his former physical condition; but there was no appreciable improvement in his aneurismal sounds, as Dr. Osler's examination showed. He was discharged March 8, 1900, a little over one month after the operation; and as Dr. Hunner's report is published November, 1900, or nine months after the operation, and no mention is made of his return to the clinic, it is presumed that the patient continued to feel no worse during that time. The final recovery of this patient, in view of the persistence of all the physical signs of an active aneurism, is quite doubtful.

No. 8. The author's case, operated July, 1900. (See text.)

DISLOCATION OF HUMERUS WITH FRACTURE OF THE UPPER PART OF SHAFT.

By N. P. Dandridge, M.D.,
Cincinnati, Ohio.

About midnight September 21st I was summoned by Dr. Brunning to his office to see a man who had met with an accident to his shoulder by falling from an electric car early in the evening. The patient was a man sixty-four years of age, stout and well developed. I at once confirmed the diagnosis which had already been made by Dr. Brunning of a fracture in the upper part of the humerus and at the same time a dislocation of the head.

From inspection the case presented the appearance of a simple dislocation—prominence of the acromion process and flattening of the shoulder, while the arm stood out somewhat from the side of the body and was supported by the other hand. Manipulation, however, revealed free motion in all directions, and crepitation was soon detected. The swelling of the arm and shoulder was already very great, but it was sufficiently evident that the head of the bone had left the glenoid cavity, though it could not be plainly located in the axilla. The whole side and arm to the elbow was swollen and discolored from the violence of the contusion.

It was decided to abstain from all attempts at reduction until the morning, when, under an anæsthetic, a more careful examination could be made. The hand was supported by a sling and the arm secured to the side by a broad bandage around the body. The next morning chloroform was given and the diagnosis of the night before fully confirmed.

With the arm drawn out at a right angle from the body an attempt was made by slight traction and direct pressure on the displaced head to force it back into place. No effect whatever was produced and the attempt was not prolonged, as the swelling and discoloration had greatly increased during the night. It was evident that there had been an extravasation of blood through an extensive area of the side from the axilla down, as well as of the whole arm. On this account it was deemed expedient to defer any operative interference for some days. It was found at this time that there had been some years ago, following an injury, an inflammatory infection of the wrist-joint, which had impaired somewhat pronation and supination.

Two days after the injury an X-ray picture was taken by Dr. William J. Taylor, which, while it is somewhat blurred, makes clear both fracture and dislocation (Fig. 1), the head of the bone in the latter not being entirely beyond the glenoid cavity. The dislocation is, however, made plain by comparison with the picture of a fracture at same point without dislocation (Fig. 2).

October 11th, eighteen days after the injury, the operation suggested by McBurney was made. An incision below the acromion process, three and a half inches long, was made directly down to the bone. The tissues were found infiltrated with extravasated blood. The incision exposed an oblique fracture, the line of fracture running from below upward and outward, with some displacement upward of the lower fragment. The periosteum was torn entirely across the exposed part of the bone and stripped up on the upper fragment for half an inch. The dislocated head was found to have moved downward about a finger-breadth and forward below the coracoid process, resting apparently on or just over the edge of the glenoid cavity.

No tear in the capsule could be seen. A hole was bored completely through the upper fragment an inch from the line of fracture. The hook was inserted and the entire arm was carried to a right angle with the body and firm traction made,

Fig. 1.

Fracture of surgical neck, with dislocation.
(Radiograph taken Sept. 23, by Dr. Taylor.)

Fig. 2.

Fracture (oblique) of surgical neck at end of four weeks. Good union.

the hook at last slipping out. On a second attempt the bone was felt to yield, and complete reduction seemed to have taken place, and the head to be in its proper position. The wound was closed, a small drainage-tube being left in place. Healing took place promptly and the arm was left undisturbed for a month, when repairs of the fracture had so far advanced that passive motion was attempted.

November 10th a skiograph was taken, and by comparison with one taken immediately after the accident it was seen that little if any change had been made in the position of the head. This was fully confirmed, and when the bandages were removed and motion attempted it was found that the dislocation persisted. Either reduction had not been complete in the first place or the dislocation had recurred; probably the first is the true explanation. Now, at the end of four months the fracture is firmly healed, but the dislocation remains. The head of the bone being so firmly fixed that the only motion of the arm is such as is secured by the mobility of the scapula, the range of motion is slowly increasing.

Since Dr. McBurney published his paper in the *Annals of Surgery* in 1894 on "Dislocation, with Fracture of the Upper End of the Humerus," a number of cases have been reported in which the operation which he then described has been practised, and invariably, so far as I know, with satisfactory functional results. I have thought it proper to add this case to the statistics of the operation, although the result is entirely unsatisfactory. The case was apparently one just suited for this treatment, and the operation was made without difficulty, and apparently succeeded in restoring the head to its proper position. I have presented this case to the Society in hopes that it may be of service to future operators, and not in any way to question the method which seems to perfectly meet the indications.

RESECTION OF THE RECTUM PER VAGINAM.

By John B. Murphy, M.D.,
Chicago, Ill.

It is not the purpose of this paper to consider in detail the pathological conditions, as fibrous stricture, tubercular disease, neoplasms, etc., which may demand the removal of the rectum. These have been admirably treated in the recent work by Quénu and Hartman, and involve such an extensive study that we will not mention them here.

The profession has not yet agreed upon a definite and satisfactory technique in the performance of proctectomy, as it has in hysterectomy and many other pelvic operations. The posterior operations, as the trans-sacral and ischio-rectal, have, in the last decade, attracted most attention and found many advocates, but that they are difficult, dangerous, and in many respects ultimately unsatisfactory, is beyond question. The mortality in fourteen of the largest European clinics is 21.2 per cent. (Prutz).

The perineal proctectomy of Volkmann is applicable only to carcinoma involving the third and lower half of the second portion of the rectum. The vaginal route has been overlooked or at least greatly slighted, and notwithstanding the fact that a number of operators have been forced by the pathological conditions present to make use of it, in only a few instances has it been the method of election.

The procedures resorted to for rectal extirpation may be classified as follows, partially after the plan of Renzaldt and Stintzing:

1. Bloodless dilatation of the sphincter. (Simon.)

2. Circular incision around the anus. (Lisfranc.)
3. Perineal methods:
   (*a*) Posterior division of sphincter. (Dieffenbach.)
   (*b*) Posterior longitudinal incision with retention of the anus and sphincter. (Kocher.)
   (*c*) Resection of coccyx. (Kocher.)
4. Trans-sacral method with resection of portions of sacrum:
   (*a*) One sitting. (Kraske—in America, Fenger.)
   (*b*) Transverse section. (Bardenhauer, Rose.)
   (*c*) Oblique section. (Hochenegg.)
   (*d*) Transverse resection of sacrum and coccyx. (Heinecke, Schlange, Kocher, Hagar, Rydygier, Marcy.)
5. Parasacral methods, division of soft parts on side of sacrum without section or excision of sacrum or coccyx. (Suckerkandl, Wölfler, Schelkly.)
6. Vaginal extirpation. (Des Quins, Norton, L. L. McArthur, Campenom, Rehn, Vautrin, Price, Byford, Bristow, Julius Sternberg.)
7. Primary vaginal cœliotomy, examination of extent of disease and then complete division of perineum, and later excision with end-to-end union of intestine—retention of sphincter. (Rehn, Murphy—after method to be described herein.)

Development of the Vaginal Operation.

1. In July, 1890, Des Quins,[1] in a case of carcinoma of the rectum involving the rectovaginal septum, removed the septum with the tumor, drew down the sigmoid and sutured it to the anal portion of the rectum which he had retained. The peritoneum was not closed by suture. The defects in the perineum and vaginal wall were closed by suture, silver wire being used for the former. The patient died shortly after operation, but it was noted that there was immediate continence of feces. Cause of death was not given.

2. December 17, 1890, A. T. Norton[2] removed a carcinoma

[1] Ann. de la Soc. Méd. d'Anvers, July, 1890.
[2] Trans. Clin Soc., London, 1890.

of the anterior rectal wall, not involving the vaginal mucosa, by complete division of the perineum without opening the peritoneal cavity. He excised the entire lower segment of the rectum, including the sphincter, and sutured the proximal end of the bowel to the skin. The patient had fecal continence one month after operation.

3. In 1891, L. L. McArthur,[1] in a secondary operation for recurrent carcinoma of the rectum, removed the diseased portion of the bowel and sutured the proximal end into the upper portion of the vagina. The operation was followed by good results.

4. Campenom,[2] in 1894, performed a resection of the rectum for non-malignant stricture not involving the vaginal wall. His incision was in the rectovaginal septum, extending out on to the perineum, which, however, was not completely divided. End-to-end approximation of the proximal bowel with the anal portion, which had been left intact, was accomplished by means of sutures. Patient recovered, stricture did not return and sphincteric control was reinstated.

5. In 1895, R. Rhen[3] removed a carcinoma of the rectum by division of the perineum, and later opened the peritoneal cavity. Death from peritonitis.

6. Vautrin,[4] in May, 1895, removed a carcinoma of the rectum *per vaginam.* The details of the operation are not given in the report.

7. In 1896, Joseph Price[5] reported an operation, performed by himself, for carcinoma of the uterus and rectum. He did an antero-posterior hysterectomy, removing the rectum with the uterus, and subsequently suturing the proximal end of the bowel into the vaginal wall. The patient recovered from the immediate effects of the operation, but died on the seventh day. Subsequently he performed an operation in which he utilized the button as a means of approximation. The case recovered,

[1] Amer. Journ. of Obstetrics, 1891, vol. xxiv. p. 567.
[2] Union Méd., October 25, 1894. [3] Centralbl. Chir., Berlin, No. 10, 1895.
[4] Reported by Thuvien. Gaz. hebdo de Med. et Chir., March 27, 1896, p. 283.
[5] Medical and Surgical Reporter, 1896, vol. lxxiv. p. 66.

and is, probably, the first case of approximation of this kind on record.

8. In November, 1896, Dr. H. T. Byford[1] reported a case of excision of a rectal carcinoma by incision through the upper portion of the vaginal wall. In his efforts to draw down the remaining portion of the rectum the peritoneal cavity was torn open. The proximal end of the bowel was sutured into the upper part of the posterior vaginal wall, with the intention of similarly suturing the anal segment into the lower part, and closing the vaginal orifice, thereby converting the vagina into a portion of the fecal tract. He does not state the result, but mentions that in a later case he successfully performed the operation, the patient surviving for one year.

9. Bristow,[2] in 1896, removed a carcinoma of the rectum through the posterior vaginal wall, without opening the peritoneum. His case recovered, and in comment he says: "Further than six inches it is not possible to go, judging from my experience in this case."

10. Julius Sternberg[3] reports from Gersuny's Clinic, in Vienna, fourteen cases of resection of the second and third portions of the rectum through the posterior wall of the vagina. All were cases of malignant disease. His results were twelve recoveries and two deaths. In some of the cases where the peritoneum was accidentally opened, it was closed with sutures. The sphincter was retained when not involved in the disease.

11. From Rhen's clinic, Liermann[4] reports two cases, one operated on July, 1897, in which the rectum and uterus were both removed, 17 cm. of the former, and in the other case, operated on January, 1898, the rectum alone was excised. The patients recovered and both had sphincteric control. Thus we find the operation of vaginal proctectomy advancing in the direction of the peritoneum and sigmoid, without any definite plan as to a vaginal cœliotomy for the removal of carcinoma of the first portion of the rectum or lower portion of the sigmoid.

[1] Annals of Surgery, November, 1896. [2] Medical News, March 5, 1896, p. 640.
[3] Centralbl. f. Chir., March 20, 1897, p. 305.
[4] Archiv f. klin. Chir., Berlin, 1899, Band lviii., p. 263.

Anatomy.

A few details of the anatomy of the sigmoid and rectum may be considered here, as they are important in the performance of this operation.

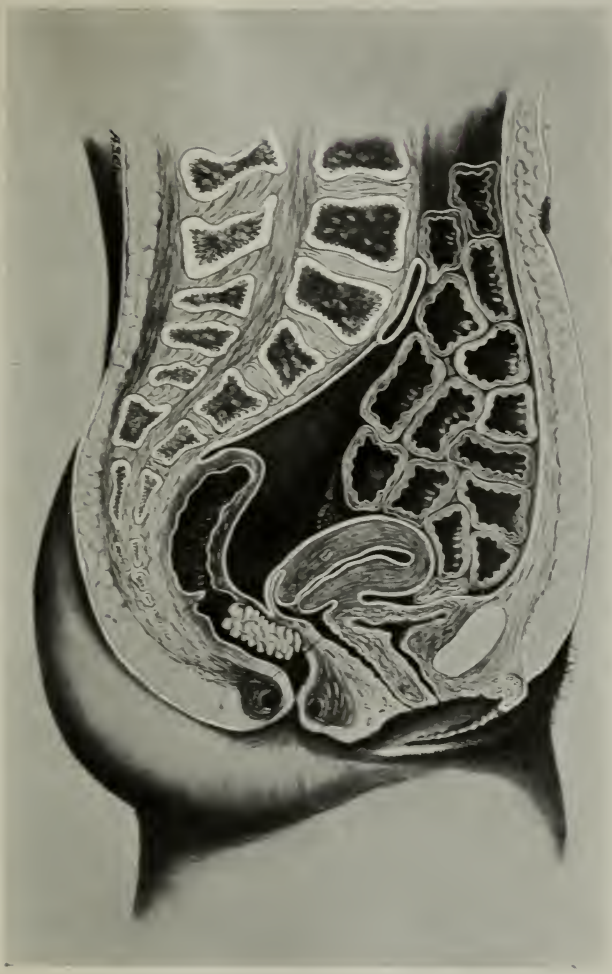
The normal position of the sigmoid is in the pelvis and not in the left iliac fossa, as is generally supposed. It begins at the outer border of the left psoas muscle, just above the brim of the pelvis, crosses the muscle at a right angle, descends vertically along the left pelvic wall sometimes as low as the floor of the pelvis, then passes horizontally to the right pelvic wall and occasionally upward into the right iliac fossa, where I have encountered it in operating for appendicitis. From here, after sharply flexing upon itself, it passes to the left as far as the median line, upon which it descends to the anus. It is supported by a mesosigmoid, whose line of attachment crosses the left psoas muscle, curves upward, passes over the bifurcation of the common iliac vessel and then passes downward on the left side of the pelvis to the median line.

It will be seen from the attachments of the mesosigmoid that this portion of the bowel can be reached and resected from the pelvis. The mesentery measures from one and one-half to three and one-half inches in length, allowing of considerable latitude of motion of the sigmoid in the pelvis, piloting such freedom of motion as may be necessary in the performance of one of its great functions, guarding against the extension of pelvic infections.

The sigmoid may rotate on its axis in a scroll-like manner and be completely surrounded by its mesentery, this being possible because of the length of the latter. It occasionally becomes adherent in this position and produces the train of symptoms known as ileus. These symptoms are produced in the presence of the above condition, when the bowel becomes over-distended and forms a sharp kink. I have operated upon two cases where the obstruction was caused by this type of adhesion.

The rectum is usually described as having three distinct por-

Fig. 1.



tions, but, more correctly, there are but two. The first portion begins at the third piece of the sacrum and extends to the tip of the coccyx. There is no mesorectum, and it is covered by peritoneum only at its upper part on the anterior surface. It is three and a half inches long, and behind is in relation with the sacrum and coccyx, whose curve it follows. In front it is in relation with the trigon of the bladder and seminal vesicles in the male, in the female with the vagina and cervix uteri. The peritoneum in the male comes to within three inches of the anus. I found on the male cadaver that eleven inches of rectum and sigmoid could be resected through a median and lateral perineal incision. The second portion, formerly described as the third, is one and a half inches long, and extends from the tip of the coccyx to the anus. Below it is surrounded by the external sphincter, and above, about one inch from the anus, by the internal sphincter, which is half an inch broad.

Case I.—(Referred to me by Col. Nicholas Senn, then in the service at Chattanooga.) Mrs. M. W. S., aged thirty-six years; occupation housewife. Admitted to Mercy Hospital July 12, 1898.

Present Illness. Ten or twelve months ago patient began complaining of indefinite pain in the lower abdomen and upper portion of the vagina. About six months ago she first noticed bloody mucous discharges from the rectum, and the feces assumed a ribbon shape. The diagnosis of "bleeding piles" was made.

Examination revealed a malignant tumor of the first and second portions of the rectum, for the removal of which operation was advised. The patient was very fleshy, and the perineal, hemorrhoidal and vaginal veins were enormously distended. Extent of disease shown in Fig. 1.

Operation. July 16, 1898. Lithotomy position.

The vagina was dilated with broad specula, the cervix drawn down and the cul-de-sac opened by a transverse incision similar to that used in vaginal hysterectomy. Large laparotomy sponges were now passed into the peritoneal cavity to displace the intestines out of the field of operation.

The tumor was carefully examined, as well as the retroperitoneal lymph glands, which latter did not appear to be involved in the disease. The tumor extended upward almost to the brim of the pelvis.

The retrovaginal septum was now divided down to the rectum by a vertical incision in the middle line, extending from the post-cervical opening and including the sphincter ani (Fig. 2). The hemorrhage, which was quite profuse from the dilated veins, was controlled by compresses and forceps.

The posterior vaginal wall was now dissected laterally from its attachments to the rectum; lateral and anterior retractors were placed in position and a large field for operation exposed (Fig. 3). The sigmoid could be handled throughout its entire extent and brought well down without the slightest difficulty.

With scissors the anterior rectal wall, including the sphincter, was divided up to the lower border of the tumor, and the anal segment of the rectum separated from that just above it, by a complete transverse incision one inch below the lower limit of the tumor. the incision extending into the post-rectal connective tissue (Fig. 4). The proximal end of the rectum was grasped with vulsellum forceps, closing it completely, and, by the use of curved scissors separated from its coccygeal and postrectal attachments, upward to the promontory of the sacrum, thus freeing and mobilizing it (Fig. 5). The hemorrhage during this part of the operation was easily controlled.

The mesosigmoid was now loosened sufficiently to allow the healthy portion of bowel to come well down. The rectum was amputated above the upper border of the tumor growth and the sigmoid and sphincteric segment of the rectum united end-to-end by silk sutures. These sutures were passed from within outward, thereby causing all the knots to be on the inside of the bowel, the ends were left long to facilitate removal.

The incision in the anterior rectal wall was closed with silk sutures, introduced in the same manner as those last described, and the ends of the divided sphincter were united by buried sutures of catgut (Fig. 6).

The laparotomy sponges were removed from the peritoneal

Fig. 2.

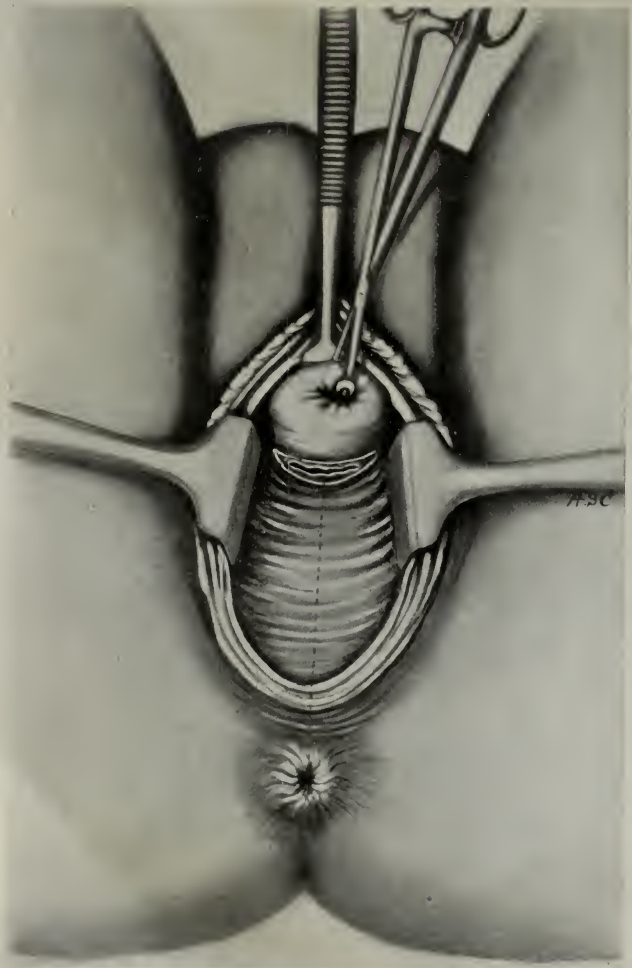


Fig. 3.

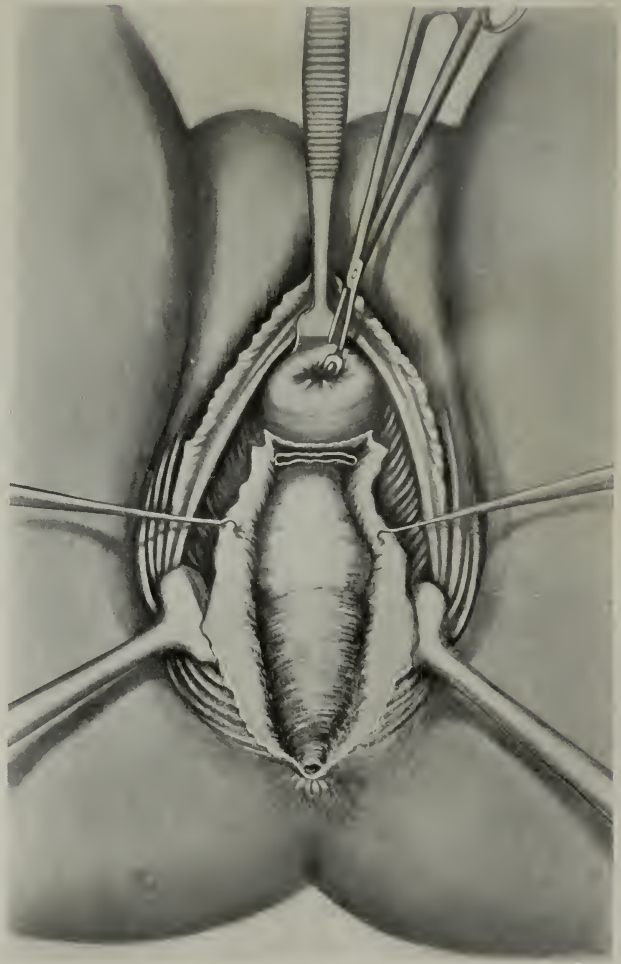
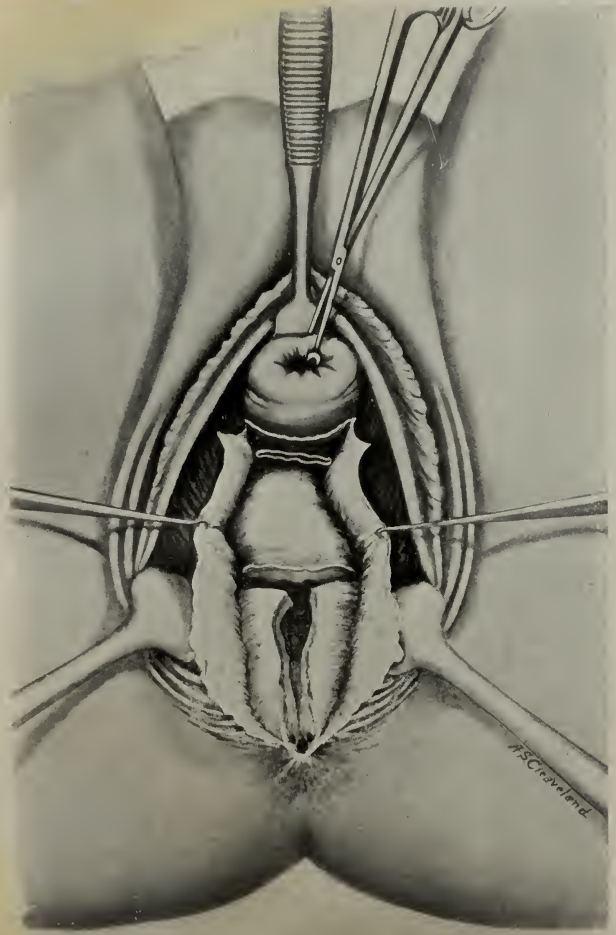
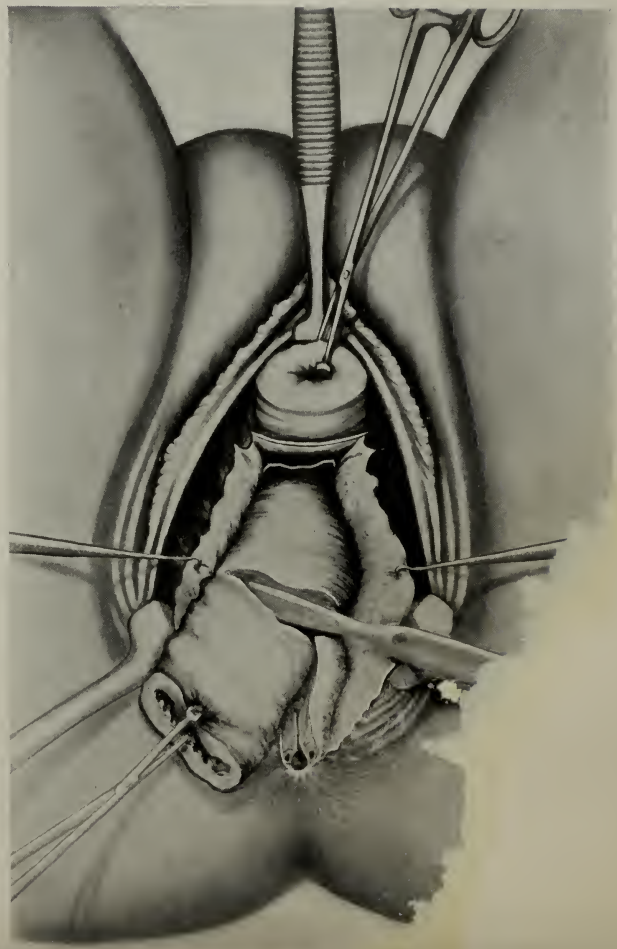


Fig. 5.





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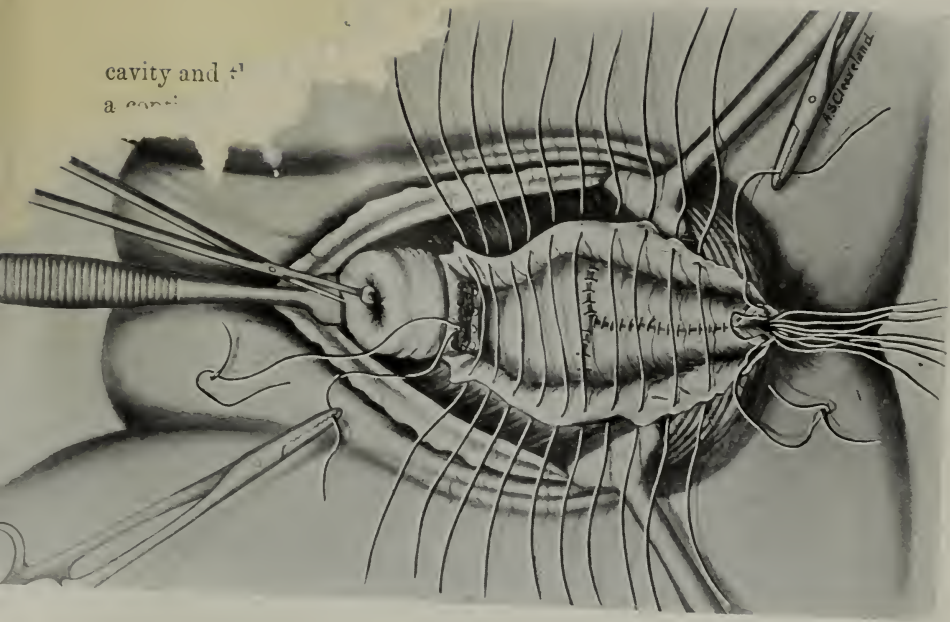
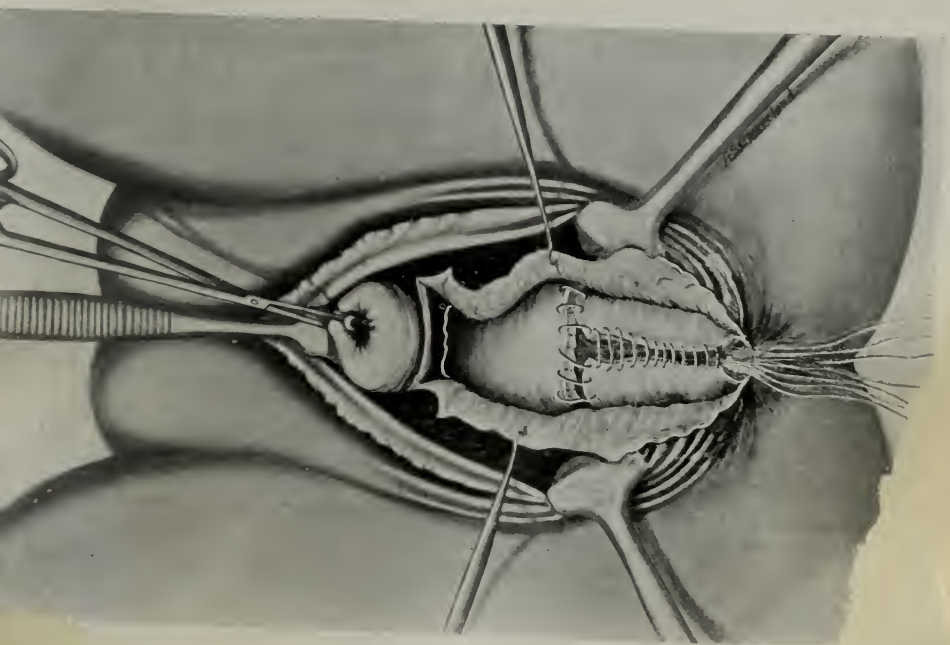




cavity and the peritoneum on the floor of the pelvis closed with a continuous catgut suture. The vaginal wall was sutured to the cervix, closing the transverse incision, and the edges of the vertical cut united in the central raphe with silkworm-gut sutures (Fig. 7). A large rubber drainage-tube, one inch in diameter, was inserted into the rectum and sutured in place.

When the patient was returned to her room the pulse-rate was 86 and temperature 97.6°. The highest temperature and pulse-rate occurred twenty-eight hours after operation, when the former registered 100 per minute and the latter 101°. Convalescence was uneventful. After removal of the rectal tube it was noticed that there was a slight fecal discharge through the vagina when the bowels were loose. This sinus was operated upon a short time later and the patient discharged, cured, September 1st.

Pathological report on specimen of rectal tumor, July 20, 1898, by Dr. W. A. Evans, was as follows: "The tumor is malignant—a cylindrical-celled carcinoma. There is a piling-up of the epithelia in the mucosa, and the submucosa is occupied by epithelial cells. The muscularis mucosæ cannot be recognized. The epithelium shows abundant traces of its glandular antecedents In places the invasion of the muscular coats by the epithelial cells is evident, and there are also to be seen in this layer areas of round-celled infiltration, showing an inflammatory process."

August 17, 1899, I received a letter from the husband of this patient, stating that she had suffered considerably since March from a strictured condition of the rectum and prolapse of the uterus, the latter organ seeming to press upon the former. After a few dilatations with the bougie and tampon the obstruction disappeared and the uterus remained in position.

In a still later letter the patient states that the stricture has again recurred. At the present time I have not had opportunity to examine her, but expect so to do in the near future.

Case II.—Mrs. D. B., aged sixty-seven years; housewife. Admitted to West Side Hospital May 22, 1899.

Present Illness. Three years ago the patient began to have severe "diarrhœa," which persisted for six months. The passages were frequent—often twenty a day—liquid in character and accompanied by tenesmus. After six months some improvement took place, but during the next year she had frequent similar attacks. For the past eighteen months she has passed considerable blood and mucus from the bowels, and the stools have been very frequent. Griping pains in the abdomen and tenesmus have been severe during the same length of time. Has lost forty pounds in weight during the past one and a half year.

Previous History. Patient had the usual diseases of childhood. The menopause occurred fifteen years ago; she has had ten children, all living and well.

Family History. Mother died of "cancer of the stomach." Otherwise negative.

Examination of the Patient. Somewhat emaciated; heart, lungs, and abdomen negative; in rectum, hard, ulcerated tumor is found on digital examination, involving the first and second portions.

Operation, May 30, 1899. An operation exactly similar to that described in Case I. was performed. Time of operation one hour and fifteen minutes.

Bowel movement through the rectal tube, which was inserted at the completion of the operation, occurred in twelve hours. The vaginal packing was removed in seventy-two hours.

On the fifth day a slight fecal discharge through the vaginal wound was noted. On the twelfth day the rectal tube was removed. Stitches were removed on the fourteenth day after operation, and on the fifteenth day the patient sat up and had a natural, voluntary bowel movement. There was still some fecal discharge into the vagina at this time.

On the twenty-ninth day after the operation, as the fecal discharge continued, it was decided to close the rectovaginal fistula by operation. The edges of the fistula were freshened and approximated by means of interrupted sutures of silkworm-gut. Tube inserted into rectum and retained in place by a suture.

After second operation convalescence was uneventful and patient was discharged from the hospital, with all wounds entirely healed, July 17, 1899.

Dr. A. H. Chandler, of Compton, Ill., who referred the case to me, states that at the present time there is no evidence of recurrence of the disease; the patient is in excellent general health and has full control of the bowels. The rectovaginal fistula has remained closed.

CASE III.—Mrs. E., aged forty years; housewife. Admitted to Mercy Hospital January 24, 1899.

Present Illness. For some time patient has complained of slight irritation and pain in rectum during defecation. The general health is good.

Examination of the patient reveals an ulcerated area with raised, slightly indurated borders, situated on the posterior rectal wall about two inches above the sphincter ani.

Operation. January 26, 1899. The sphincter was dilated, and the ulcer was brought down with vulsellum forceps and excised. The edges of defect were united by means of silk-worm-gut sutures, perforated shot being used for retention. Patient was discharged from the hospital, February 18, 1899, improved. Examination of the tumor showed it to be a simple adenoma.

Re-admitted to Mercy Hospital, May 4, 1900, suffering from recurrence of the symptoms mentioned above.

Examination of the rectum showed an ulcer situated on the posterior wall about one and a half inches above the internal sphincter, apparently involving the mucous coat only.

Operation, May 5, 1900. Sphincter dilated, ulcer drawn down and excised by cutting well outside its borders. Edges of rectal wall drawn together with catgut sutures. A gauze drain left in rectum. Patient discharged May 30, 1900.

Admitted to Mercy Hospital for the third time September 11, 1900, complaining of the same symptoms as before, with some bloody discharge from the rectum. Examination showed an indurated mass involving the posterior wall of rectum at site of former operation and extending upward.

Operation, September 12, 1900. The diseased portion was resected after the method described in Case I.

No unpleasant symptoms followed the operation except a rise in temperature, which took place thirty-six hours later and persisted, ranging from 100° to 101.5° until September 22d. A slight fecal discharge into vagina was noted several days after operation, but at no time became profuse. Almost immediately there was sphincteric control, weak at first, but gradually growing stronger during convalescence until date of discharge, November 5th, when it was almost complete. Recto-vaginal fistula had closed when patient left hospital.

Microscopical examination of specimen shows it to be composed principally of adenomatous tissue (Fig. 8), with beginning proliferation of epithelial cells in the deeper layers of the rectal wall (Fig. 9). Carcinoma.

CASE IV.—Mrs. K. P., aged thirty-one years; housewife. Admitted to Cook County Hospital, October 16, 1900.

Present Illness. About seven years ago patient was first troubled with constipation, which has gradually grown worse until the present time, compelling her to use cathartics and enemata daily. Has considerable pain on defecation. Has never passed blood from bowels.

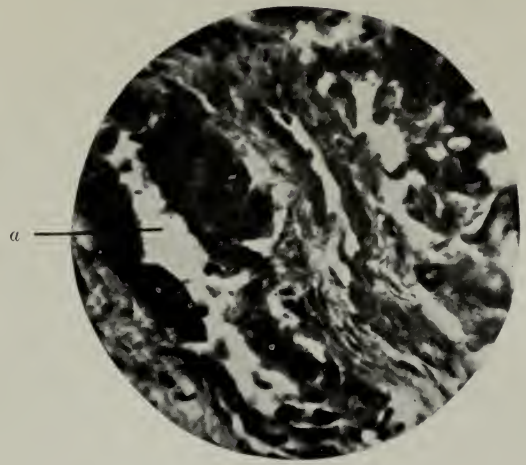
Two years ago, after confinement, patient had "child-bed fever," which kept her in bed for nearly four months. After this she experienced bearing-down pains in the pelvis and back aggravated whenever she assumed the erect position. States that her "womb seems to fall," and has noticed a portion of the cervix protruding from the vulva.

Previous History. Measles in childhood; rheumatism about eight years ago, sick for one year; never had severe diarrhœa nor dysentery; knows of nothing that might have caused her constipation; denies all venereal infection; began to menstruate at sixteenth year, always regular, flows about four days at each period. Two children, first about sixteen years ago, second about two years ago, after which patient had the fever. One miscarriage about five years ago, no trouble following. Uses liquors and morphine.

Fig. 8.

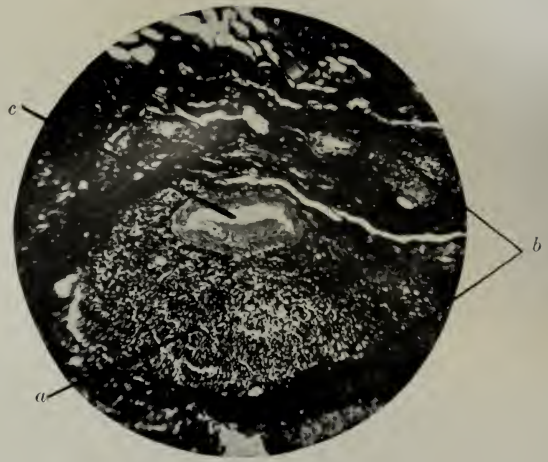
a. Proliferating gland tubes.

Fig. 9.



a. New-formed gland tube in deep tissue.

Fig. 10.



a. Area of round-cell infiltration about vessels.
b. Old fibrous tissue.
c. Small vessel with proliferating intima.

Family History. Negative.

Examination. Heart, lungs, and abdomen negative.

Vaginal. Uterus prolapsed, anterior, posterior and lateral vaginal walls bulging into vagina, and entire uterus low and poorly supported. Old lacerations of perineum cause lax vaginal outlet and are evidently responsible for the displacement.

Rectum. About two and one-half inches above anus is an annular stricture hard and movable; cicatricial tissue completely surrounds the rectum and the opening admits only the finger-tips; the surface is not ulcerated.

Operation, November 10, 1900. Stricture removed by resecting rectum through vagina and opening the peritoneal cavity. Sphincter was retained and showed firm contraction at completion of the operation.

At the present date, January 11, 1901, there is partial failure of the perineal union, but an excellent end-to-end approximation of the bowel. The perineum will be repaired by the ordinary method.

CASE V.—Miss N. S., aged twenty-six years. Occupation clerk; single. Admitted to Cook County Hospital, December 3, 1900.

Present Illness. Three and one-half years ago patient fell from a bicycle severely bruising the muscles over the left ischial tuberosity and causing an abscess near the rectum, which ruptured spontaneously. It remained an open sore for two weeks then the wound healed, but subsequently a second abscess in the same situation had to be opened by a physician. After this a small opening, the size of a pin-head, remained for seven months, at the end of which time an operation was performed and the sinus was incised and drained. Wound healed in five weeks. One year later a yellowish discharge began to flow from the old wound; other openings at some distance from the anus were formed.

Previous History. As a child had infectious diseases; six years ago erysipelas; back was injured by being shut up in folding-bed five years ago; menstruation began at thirteen

years, always normal, until one year ago, when it became scanty; denies all venereal infection and gives no history of syphilis.

Examination. Skin over left ischial tuberosity is perforated with a dozen or more fine openings leading into sinuses which communicate freely. Skin is indurated and thickened but almost painless on pressure. Sinuses do not extend deeply into muscular tissue. The clinical appearance is that of lupus.

Rectal Examination. Reveals a narrow circular stricture of the rectum about two and a half or three inches from the anal opening. Above the stricture there is an ulceration extending upward two and one-half inches. The stricture is movable.

Vaginal Examination. Negative.

Back. Several vertebræ in the lower dorsal region project, though there is no tenderness or evidence of inflammatory processes. Lungs and heart negative; no tubercle bacilli found in the sputum.

Operation, December 14, 1900. Rectum resected through the vagina by the method described under Case I., two and one-half inches removed. Peritoneum closed; postrectal drainage.

Examination of patient, January 17, 1901. For past four days patient has had complete control of the sphincter. Previous to that it was partial. Rectovaginal septum and perineal body have united, leaving no fistulous communications. Rectal tube, which was inserted at the time of operation, was removed after eighteen days, and the sutures have been taken out since. Sphincter contracts on the finger when inserted into the rectum, but not with normal vigor. Skin lesion, which was present over the buttocks before operation, has materially improved.

Microscopic examination of the tissue removed is as follows: The mucous membrane, where present above stricture, is of about normal thickness. The tissue producing the stricture is composed principally of dense fibrous bands, with scattered areas of small round-celled infiltration. No epithelioid or giant-cells found, and there is an entire absence of caseous de-

generation. Endarteritis obliterans is a prominent feature throughout the sections, which would lead us to suspect that the process was syphilitic rather than tubercular (Fig. 10).

CONCLUSIONS: The advantages offered by the vaginal route are:

1. The sacrum and posterior bony wall of the pelvis are not disturbed.

2. The field of operation is as extensive and the anatomical parts as accessible as in the trans-sacral operations.

3. The peritoneal cavity is opened in both the vaginal and sacral operations, and in neither is it a source of great danger.

4. The diseased tissue is more accessible for inspection, and the extent to which the operation may be carried in an upward direction is as great, if not greater, than by the sacral route.

5. The peritoneum may be drained freely through the vagina.

6. A perfect end-to-end approximation, either by suture or by the use of the button, may be secured. The preferable method of uniting the two ends is by interrupted sutures of silk; as there is no peritoneum on the sphincteric segment, the danger of failure of union with button is present.

7. The sphincter is retained and the peritoneal body is restored. There is diminished action of the levator ani and muscle.

8. When the operation is complete the parts are practically in their normal positions.

I have performed the same operation on the male cadaver and find that by splitting the sphincter directly through the median line, anteriorly and posteriorly, cutting back to the coccyx and opening the rectovesical fold of the peritoneum, practically the same field for operation can be obtained as in the female. Several inches of the bowel can be excised and end-to-end union secured. Either anteprocteal or postprocteal drainage may be used. The cut ends of the sphincter are united anteriorly and posteriorly. The lateral nerve-supply on either side is not disturbed.

TRAUMATIC GANGRENE.

By J. B. Murfree, M.D.,
Murfreesboro, Tenn.

Gangrene is derived from a Greek word which means to corrode. It has been defined to be the arrest of the functions of organic life in circumscribed portions of the soft parts of the body, leading to the complete death of the same. The whole process of death is included in the term gangrene, the result being mortification or necrosis of the invaded tissues, organ, or limb. It is distinguished from ulceration by the fact that gangrene is death of the whole part involved—*i. e.*, is death in mass—while ulceration is death only of the superficial tissues; is molecular death in a part. Gangrene is death in mass of the soft tissues, while necrosis is death of the bony tissues and is sometimes applied to the death of an internal organ when death takes place without putrefaction and the dead tissue is absorbed and replaced by granulation tissue. Gangrene in its various forms is often met with, and is interesting to the surgeon in its causes, manifestations, and treatment. There are quite a number of different varieties of gangrene, but they all may be included under the two general terms of moist and dry gangrene. Gangrene is caused by either an interference (a diminution or cessation) of the arterial blood-supply to a part or to an obstruction in the venous system, which prevents the return of the blood or to a stagnation of the blood in the capillary vessels. It sometimes, however, is caused by the direct action of irritants or chemical caustics upon the cells of a part without any interference with the circulation of the blood directly. The essential cause of gan-

grene is a disturbance or arrest of the nutrition of the tissues in part or in whole, which is due to an obstruction to the circulation of the blood in the arteries, veins, or capillaries. The causes of these obstructions are many and varied. When the gangrene is due to an arrest of the circulation of the blood in an artery it is usually of the dry variety, while an interruption or obstruction to the outflow of the venous current produces a moist gangrene. Traumatic gangrene is the result of a traumatism; an injury of the bloodvessel, either arterial or venous, which directly or remotely disturbs the nutrition of the tissues by an interference with the circulation of the blood through the part. If the injury is in an artery the result will be a dry gangrene; whereas, if the disturbance is in a vein, it will be a moist gangrene. Extensive wounds which produce large and severe contusions or lacerations of the soft tissues, or violent injuries to the bones where fragments injure the bloodvessels produce a moist gangrene, which is also recognized as traumatic gangrene. In this event the gangrene may be due to a direct injury of a vein, or the resulting active inflammation may produce such a turgescence and congestion that the blood stasis is so great as to produce death of the part. If from an injury to a bloodvessel or from a severe acute inflammation gangrene results, and the wounded part becomes infected with micro-organisms, not only does death of the part primarily occur, but the gangrene extends sometimes with frightful rapidity, putrefaction sets in, and through the agency of the infecting bacteria spreads extensively, producing what is denominated spreading traumatic gangrene. The symptoms of traumatic gangrene are those of gangrene in general modified by the cause and the seat of the injury. The prodromic symptoms are aching pains in the limb, with slight numbness; the pain increases in severity. At first it is intermittent, but the frequency increases, while soon the pain becomes almost continuous, the muscles become rigid, and their power of contracting is lessened. These symptoms may pass off with rest, but will return with the slightest exertion. As the disease advances there is a coldness of the skin, a numb-

ness and tingling in the extremity and the muscles. The part remote from the seat of injury becomes congested and is gradually discolored, assuming a dark purple hue, which eventually turns black and the part is either dry or moist. If moist, watery blisters form, which soon break, exuding a thin, offensive fluid and revealing the dead tissue beneath. In dry gangrene the dead part becomes hard and shrivelled, emitting but little if any odor. The disease spreads slowly, gradually extending up the limb, the invaded tissue undergoing the same transformation. There is usually a slight rise of temperature, but the fever is low unless there is a large area of tissue involved in the diseased action when there will very likely be more or less of a septic infection, which will produce a high temperature. At first there is an absence of pain or but little, but as the diseased action progresses the pain soon becomes very intense and annoying and constitutes a prominent symptom. The patient is unable to sleep on account of the pain, while there is a loss of appetite, and as a result he becomes worn out and possibly may die from exhaustion. In traumatic gangrene there is usually no well marked line of demarcation, yet there is a well noted distinction between the diseased and healthy tissue. The diagnosis is usually not difficult, the symptoms generally being well marked, and on ocular inspection the disease speaks for itself. The treatment of traumatic gangrene locally consists in a careful and thorough removal of all the dead tissues, afterward a complete sterilization of the parts by frequent and copious antiseptic irrigations. The general treatment must be supporting and sustaining of the system by the free administration of tonics, stimulants, and nutrients, with an anodyne when needed. "In traumatic gangrene involving the extremities, as soon as the gangrenous process is well established, if the patient's constitutional condition is fair it is not wise to wait for lines of demarcation and of separation to form, but to amputate the part through healthy tissue and thus avoid the risk of incurring septic infection."

This is a well-established principle in surgery, but in order

to be successful in the application of the principle we must be sure that the amputation is done through healthy tissue, which can only be assured by going above the seat of injury. These remarks upon gangrene are made as a preface to the report of the following case of traumatic gangrene, the result of a gunshot wound:

Addie H., female, colored, aged twenty years, married and the mother of two children, robust and healthy, with well developed muscles, was accidentally shot on the 5th of August, 1900. The gun was an ordinary shot gun loaded with (No. 8) bird shot, and was discharged within three or four feet of where she was standing. The entire load of shot struck the anterior part of the left thigh and entered the tissues *en masse*, passing directly backward, tearing their way through the skin, muscles, vessels, and connective tissue to the femur, by which they were deflected and lodged on the inner side of the thigh in the vicinity of the femoral vessels. The hemorrhage was quite free. I saw her in about an hour after the receipt of the wound. The external wound was large and extended back to the bone and from there to the inner side of the thigh, but upon examination I did not discover any injury to either the femoral artery or vein. All foreign substances were carefully removed from the wound except the shot, which were so numerous and so completely buried in the tissues that they could not have been removed without doing great violence to the parts. The wound was situated anteriorly, about the junction of the upper and middle part of the thigh. The hemorrhage, which was quite free, was readily arrested by irrigating the wound with hot water, after which it was rendered aseptic by irrigating with a solution of the bichloride of mercury, 1 to 2000, which was washed away with hot sterilized water. To prevent a recurrence of hemorrhage the wound was packed with iodoform gauze and then dressed antiseptically and the patient put to bed. In a few hours reaction came on and was full and permanent. The wound was dressed once daily, being well irrigated with a bichloride solution, 1 to 2000, followed by ster-

ilized water. The dead tissues in the tract of the wound sloughed and readily came away, followed by healthy granulations. The wound being on the anterior of the thigh and extending directly backward to the bone (which was still covered with the periosteum), looked precisely like a hole which had been bored with a two-inch auger through the flesh down to the bone. The patient was a stout, healthy woman, with large and fully developed muscles; consequently, there was a prompt and steady effort of nature to repair the damage. There was but little rise of temperature after reaction was established; the pulse was regular, yet a little weak and frequent. For nine days after the injury the patient did well, was cheerful, with a good appetite and regularity of secretions, while the wound was promptly filling up with healthy granulating tissue. About this time she complained of a severe pain on the under side of the limb in the popliteal space, extending downward and to the inner side of the leg in the direction of the anterior tibial artery.

The pain at first was not severe, but each day it became more and more severe, and extended upon the dorsum of the foot to the great toe and the adjoining one. In a few days the pain became excruciating, so much so as to interfere with sleep, being somewhat paroxysmal in character, often causing her to scream out as if in great agony. The pain continued for several days along the leg and the dorsum of the foot, but worst at the first and second toes, and finally localized there. After three or four days there was a bluish discoloration of the first and second toes, which gradually extended to the other toes; meanwhile the pain continued. One week after the pain became localized in the great toe, and the parts were discolored. The gangrene had extended to the other toes and partly upon the dorsum and sole of the foot, and there was a clear and well-marked distinction between the gangrenous parts and the healthy tissue. True, there was no distinct and well characterized line of demarcation and separation, but the extent of the dead tissue was regular and well observed. Thinking that the gangrene had localized itself in the toes

and part of the foot, and above that point the tissues were healthy on September 2d, four weeks after the receipt of the wound, I amputated the foot at the tarsometatarsal joint, hoping that I was well above and away from the diseased part, and that the circulation above this point was uninterrupted. In this I was mistaken, for in twenty-four hours after the removal of the foot disintegration of the tissues began in the flaps, and soon the gangrene extended above the ankle, then fully realizing that there was a thrombosis of the femoral artery, instead of an embolism of the vessels of the toes. And so four days later I amputated the thigh at the junction of the upper and middle thirds as the only means of saving her life. The patient was greatly exhausted at the time of the operation by the long continuance of the gangrenous process and by the shock from the recent amputation of the foot. At the beginning of the operation she was stayed up by a hypodermic injection of morphine and strychnine; the strychnine being repeated during the operation and by the use of an Esmarch bandage, there was but little loss of blood. Yet, in spite of these precautions, she was almost depressed during the operation beyond the point of rallying, and after its completion reaction was tardy, so much so that I had serious apprehensions of her dying from the shock. As soon, however, as the stump was dressed, which was quickly done, she was put to bed and artificial heat applied to her body and extremities, after which the normal saline solution was administered every few hours, the first few times subcutaneously under each breast and in each flank, afterward per rectum. In less than twenty-four hours she had reacted well from the shock, and from then on her convalescence was uninterrupted. She soon had a return of appetite, took food readily and with a relish, the heart's action soon became strong and regular, and day by day there was an improvement in her general strength, while the wound promptly healed up, with but little suppuration, making a neat and well padded stump.

A dissection and examination of the amputated limb showed that the femoral artery was thrombosed at the point of the

gunshot wound, extending down the whole length of the artery. The thrombus filled the lumen of the artery, and could be squeezed out in long strips. The amputation should at first have been done at the seat of the injury, instead of being done at the tarsometatarsal junction. But the gangrenous process extended so slowly that it looked cruel to deprive a poor laboring woman of one entire limb without at least making an effort to save the major part of it. This case serves to prove the correctness of that principle of surgery that in traumatic gangrene of a limb the amputation should be done above the point of injury.

GASTRO-ENTEROSTOMY WITH THE MURPHY BUTTON IN MALIGNANT OBSTRUCTIONS OF THE PYLORUS.

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In this paper discussion will be limited to the use of the Murphy button in malignant strictures of the pylorus. In benign strictures the thickness of the stomach wall, in some cases as much as half an inch or more, makes it very difficult if not impossible to use the button. And then the question of time is not so important. The slow onset of benign constructions allows the compensatory thickening of both the mucous and muscular coats, whereas in malignant growths, the rapidity of its progress permits no such change to take place, but even in benign strictures the trend of opinion is growing more and more favorable to the use of the button. Of course, if the case is seen early a more radical operation is indicated. Removal of the growth, pylorectomy or gastrectomy, partial or complete, may be considered, but if the case is beyond such interference gastro-enterostomy should be done. I do not think the operation should be limited to favorable cases only, for even if very weakened the operation holds out at least some hope of comfort to the sufferer.

It should be impressed upon the profession that malignant growths of the stomach are surgical diseases, and as such should be treated. How few cases are seen by the surgeon until it is too late to do anything more than a palliative operation?

Gastro-enterostomy is only a palliation, but the prolonging of life, extending it for many months, the relief from pain

and suffering, and the general comfort conferred upon the patient, will justify its performance in all late cases where the other organs are not so seriously involved as to preclude any possibility of offering to the patient the hope of relief.

By stopping the passage of food through the pylorus and the irritation caused therefrom, the rapidity of growth is lessened, in some cases for a time seemingly checked, and the patient, if surviving the operation, is often restored to comparatively good health, temporarily.

The saving of time by the use of the button in these cases, already emaciated and weakened, is invaluable, and while from the reported cases the suture anastomosis gives approximately the same mortality. It is obvious that other things being equal, in the hands of the average operator the button operation is to be preferred. The suture operations have usually been performed upon selected cases, while the button cases have frequently been in very bad shape.

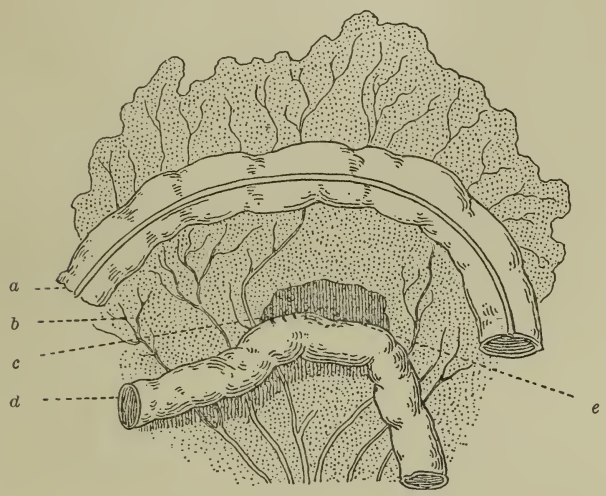
The mortality in 149 cases I have collected, all malignant, is approximately 35 per cent., but with improved technique and earlier operations this will no doubt be lessened. Czerney, in non-malignant cases, has reduced his mortality from 25 per cent. before 1895 to 3 per cent. since. The disease being absolutely fatal and accompanied by so many distressing symptoms, few patients will reject even so slight hopes of relief if it is offered to them.

Technique. To my mind, a very important part of the operation is the preparation of the patient prior to its performance. While few germs live and thrive in the stomach, their presence there in large numbers has been proven after the ordinary taking of food. For this reason, for at least four days preceding the operation, and longer if possible, only small quantities of food should be given by the mouth, and that only of food thoroughly sterilized by heat. This should be given at short intervals. The mouth, teeth, and gums should be thoroughly cleansed frequently, and the stomach should be washed at least twice a day. In emaciated and very weakened patients, rectal feeding should be used also, being careful not to irritate the

rectum, for we must utilize it after the operation to assist in sustaining the patient during the time the anastomosis is becoming firm. Chlumsky, by experimental tests, has shown that by the eighth day the impermeability of the union is nearly equal to that of the gut, and by the tenth day fully so.

For at least twenty-four hours preceding the operation no food should be given by the stomach, though small quantities of sterilized water and small doses of brandy may be given, but by using the rectum thirst may be alleviated and stimula-

FIG. 1.



Von Hacker's posterior anastomosis.

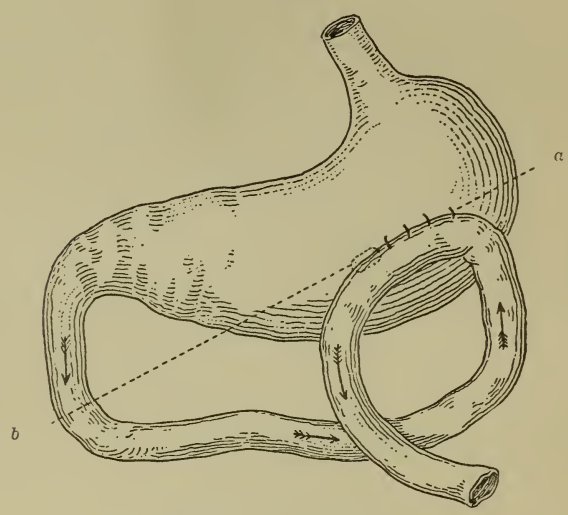
a, transverse colon; *b*, mesocolon; *c*, sustaining suture; *d*, jejunum; *e*, button.

tion accomplished. The stomach should be washed immediately before the operation, and even then, in spite of these precautions, it is almost impossible to thoroughly cleanse it. At the time of operation almost invariably the stomach will contain particles of food taken many days previous, clots of blood, etc.

Von Hacker's posterior operation after lifting the omentum and transverse colon over the stomach, if necessary delivering them out of the abdominal incision, tearing through the meso-

colon into the lesser peritoneal cavity and making the anastomosis in the posterior wall of the stomach, should be preferred, though it takes a little more time and is somewhat more difficult than the Wolfer or anterior operation. In the anterior anastomosis there is a possibility of the intestines becoming compressed between a distended colon and the abdominal wall. In the posterior operation there is less tension upon the line of union and the tendency to regurgitation of bile

FIG. 2.



Wolfer's anterior operation.
a, sustaining suture; *b*, button.

does not seem so great as in the anterior operation, though this regurgitation is not entirely prevented. However, the researches of Carle and Fantino show that the presence of bile in small quantities in the stomach, even for as long a period as three months does not materially interfere with digestion.

It is also probable that the discharge of the button is more favored by the posterior operation. In this operation it is important that the borders of the torn mesentery should be sutured to the stomach, for if not the opening therein will

probably contract or at least so constrict the intestine that not only the passage of the button, when discharged, will be prevented, but also that of anything but liquids from the stomach into the intestines. Post-mortems have not shown that contraction of the button opening occurs, though Myer reports a possible case.

In the posterior operation the coil of intestine adherent to the spinal column by its proximal end is the one to be selected; in the anterior operation that portion of the jejunum where the mesentery is long enough to allow its attachment to the stomach without too much tension, after being lifted over the colon. This is usually about fifteen or sixteen inches from the attachment to the spinal column. In finding which is the proximal and which the distal end of the intestine, Nothnagel's test of applying salt to cause peristalsis is fallacious. It is best to lift the omentum and colon up over the stomach and depressing the small intestines with pads and feeling or seeing the plica duodeno-jejunalis, or where the duodenum is attached to the spinal column. From there one cannot get lost.

The longer half of the button should be used in the stomach.

One mistake often made in the use of the button is the tendency to make the incisions in the stomach and intestine too long, thereby causing so much puckering when the purse-string suture is tightened as to interfere with the proper closing of the button. The incision should not be quite the length of the diameter of the flange of the button, which should be forced through sideways, being careful not to injure the organs in so doing. Kuemmel used instead of the purse-string suture, transverse sutures, but he has returned to the original suture, which seems to give the best results, and is easier to apply. The two halves of the button should be taken with each thumb and forefinger resting upon the flange, not on the openings, and pressed firmly together. Care should be taken to close them firmly, yet not too tight for fear of too rapid sloughing, and if closed properly leakage cannot occur. Care must be taken that the mucosa does not project and obstruct the calibre

of the button, and if it does it should be trimmed off with the scissors. When leakage does occur, it is at the folds made by the purse-string suture adhesions not having occurred uniformly around the button. For this reason this suture should be placed near the incision, not penetrating the mucosa. Reinforcing sutures are not necessary. They require quite a little more time, and it is doubtful if the added security compensates for the time consumed in inserting them. Statistics do not show their supposed advantage.

It is well to put a few sutures in the proximal portion of the intestine, suturing it to the stomach. Tension upon the line of union and the tendency to regurgitation is lessened, and the flow of bile and food into the distal intestine is aided. They also lessen the possibility of a kink or twist of the gut, accidents which have occurred with disastrous results; and also to a certain extent prevent the formation of a spur obstructing the opening. These sutures are more important in the anterior operation than in the posterior one, but should be used in both. If time saving be not so important a few Lembert sutures may be used, reinforcing the button, but statistics do not show that the mortality is lessened thereby.

Care should be taken to have the direction of the intestine such that the axis of the waves of peristalsis are in the same direction as that of the stomach, though even this does not always prevent the regurgitation of bile. Entero-enterostomy has been advocated to prevent the "vitiated circle," but the length of time required is a serious objection, and it does not always accomplish its purpose. It has been recommended that after dividing the intestine the proximal portion be transplanted into the distal lower down. This is open to the same objections.

The button is usually passed in from eight days to three months, in about half the cases having been found in the stools before the thirtieth day. In a case I have had this year the button was removed from the rectum on the eighty-first day. How long it had been there I am unable to say. The fact that the button has not been found does not necessarily

prove that it has not passed, for it may have done so unobserved in the hardened fecal matter, or it may have lodged in the rectum. I would suggest that if after twenty-five days the button has not been found after careful examination of the stools, the rectum be systematically explored every two or three days to see if it be not contained therein. Kuemmel, in six cases of the posterior operation, reports that the button was not observed to pass, and yet at the post-mortem they could not be found either in the stomach or intestines.

So far as has been reported, even when the button has dropped into the stomach, and this is more likely to happen in the anterior operation, no harm has resulted.

Feeding both by the stomach and rectum should be commenced as soon as the patient has recovered from the anæsthetic, small quantities being given at first. When vomiting of bile occurs, and this is very frequent, the stomach should be washed frequently.

Rutkowski has favored a gastrostomy with the insertion of a tube through the anastomotic opening and into the intestine, and feeding the patient through the tube. The objection to this is that the stomach cannot be washed except by lavage, and that if the tube once slips out or is removed it cannot be replaced.

Before hearing of his suggestion I had used a simple gastrostomy, done by a combination of the Kader and Witzel operations, introducing the tube into the stomach only. This procedure prolongs the operation but slightly, and is less complicated than the insertion of the tube into the jejunum through the button, and enables one to thoroughly wash the stomach before each feeding and that without the slightest discomfort to the patient, as would be the case in lavage by the œsophagus. There is no difficulty in the food thus given passing through the calibre of the button, and any possibility of its obstruction by blood or foreign substances is obviated.

The great advantage of being able to feed the patient through the tube immediately after the operation with small

quantities of predigested food and stimulants is almost invaluable.

In looking over the reported cases, the cause of death in nearly 40 per cent. is attributed to "asthenia, continued vomiting, inanition, possible obstruction of the button," etc. While it is possible that but few of these cases could have been saved, it is probable that some of them at least could have been. The continued vomiting and nausea are due, in most cases, to the regurgitation of bile in the stomach.

The stomach should be washed through the tube before each feeding, which should be every three hours until the patient has regained strength, when the interval may be lengthened and the amounts increased.

Peptonized milk, somatose, broths, raw eggs, brandy, etc., should be given freely, not more than four or six ounces at a time, however, depending upon the size of the stomach. This feeding may be done irrespective of the appetite or desires of the patient, and regardless of the nausea present.

While I have only used it in one case, I should advocate it in every one. It was remarkable the amount of food that was given and assimilated, and that without any apparent strain upon the digestive organs. The tongue remained clean all the time, practically no nausea was complained of, and the bowels could be thoroughly controlled. Salts or whatever medicine thought necessary can be given through the tube.

When the patient has regained sufficient strength the tube may be removed and the opening allowed to close.

The operation need take but a few additional minutes in addition to the anastomosis, and the time taken is amply compensated for in the remarkable advantages obtained therefrom.

Conclusions. 1. I would insist upon the fact that malignant growths of the stomach are surgical diseases, and as such should be treated and operated upon.

2. I would advise a gastro-enterostomy in all cases of malignant obstruction of the pylorus when a more radical operation

cannot be done, even though the patient be weakened and the case far advanced.

3. Use the Murphy button in preference to a suture anastomosis, it requiring much less time and giving as good if not better results.

4. I suggest that a simple gastrotomy be done upon all cases so operated upon.

THE SURGERY OF THE GASSERIAN GANGLION.

By Wallace Neff, M.D.,
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There is no more painful and distressing malady than trigeminal neuralgia, nor a more difficult and dangerous operation in surgery than extirpation of the Gasserian ganglion, which has been so successfully performed for its relief. Neuralgia of the fifth nerve, variously described as trifacial, trigeminal, tic douloureux, prosopalgia, etc., is more frequent than all other forms of neuralgia, and has been recognized and treated in a variety of ways for centuries. The *Lancet* (1829, p. 367) gives an interesting account of the discovery of notes and memoranda, which were presented by Lord King to Dr. Clarke, at the College of Physicians, London, June 1, 1829, showing that John Locke was a physician as well as a philosopher. The notes referred to his diagnosis and treatment of the case of the wife of the English Ambassador at Paris in December, 1677. He described with great accuracy the symptoms of tic douloureux, with reflections as to its cause, and the best method of treating it.

Neurotomy for relief of facial neuralgia is not a modern operation. It was first suggested by Galen and Albinus, and it was employed by Marechal, surgeon to Louis XIV., as early as the middle of the eighteenth century.

In 1798, John Haighton published an account of a successful operation for neuralgia of the face by section of the affected (infra-orbital) nerve.

The operation was so frequently employed after this that it fell into disrepute. It was revived again, about 1852, by Roux and others (*Treves' Manual of Operative Surgery*).

Nerve stretching succeeded neurotomy, and later neurectomy came into vogue. Horsley (*British Medical Journal*, November, 1891) mentions another method, of thrusting a red-hot wire into the foramen of exit, but this never came into general use.

Nussbaum introduced ligation of the internal carotid, but this was soon abandoned.

In 1858, Carnochan, of New York, advised the removal of Meckel's ganglion, and the trunk of the nerve at its exit from the foramen. He reached the ganglion through the antrum. There have been many modifications of this operation, but they are all practically Carnochan's method.

Leucke, of Strasburg, removed Meckel's ganglion by resecting the zygomatic arch, and turning it upward with the fascia attached, and thus reached the pterygoid fossa, and resected the nerve and ganglion. Great deformity was the result, so Lossen, of Heidelberg, turned the flap downward instead of upward. Horsley elevated the eye from the floor of the orbit, opened the infra-orbital canal, and followed the course of the nerve until he could divide it at its exit from the foramen rotundum.

In 1872, Pancoast resected the inferior division of the nerve at its exit from the foramen ovale.

Kroenlein resected the inferior and middle branches of the nerves as they emerged from the skull.

The operations from the outside of the skull proving unsatisfactory, J. Ewing Mears (*Transactions of the American Surgical Association*, 1884) proposed an intracranial operation and removal of the Gasserian ganglion.

Rose, of London (*Lancet*, November 1, 1900), made the first extirpation of the Gasserian ganglion on April 2, 1890.

About the same time, Andrews, of Chicago, made the operation also. Rose being the first to publish his results, the operation became known by his name. They both reached the ganglion by trephining the base of the skull in the pterygoid fossa in front of and at the outer side of the foramen ovale. The zygomatic arch was resected and turned upward, the

coronoid process was divided and turned forward with the temporal muscle.

The Hartley-Krause method succeeded this, and was described about the same time by Hartley, in New York, and Krause, in Germany. The time and method of both operators was so nearly identical, that it has received the name of both. Hartley's first operation was made August 15, 1891 (*New York Medical Journal*, March 19, 1892), and Krause's, February 23, 1892 (*Die Neuralgie des Trigeminus*).

The operation consists in raising an omega-shaped osteoplastic flap from the temporal fossa. The only difference in the two methods being that Hartley used a chisel to raise the flap, and Krause an electric saw.

The Hartley-Krause method with or without modifications is the one now employed by most operators. To the brilliant operations and able writings of Tiffany,[1] Keen,[2] Spiller,[3] Abbe,[4] Carson,[5] Murphy,[6] Cushing,[7] Dana,[8] and Beck[9] we owe in a large measure our present knowledge of this disease, and the best methods devised for its relief, and to them the writer is chiefly indebted for the information contained in this paper.

In order to properly appreciate this affection, and the hazardous nature of the surgical intervention necessary to effect a cure, it might be well to briefly consider the anatomy of the region involved.

Anatomy. The fifth nerve emerges from the brain with two roots. The posterior root, consisting of about a hundred bundles of nerve fibres, and stronger than the other, is first visible in the groove of the crus cerebelli ad pontem. Its fibres are sensory. The anterior root is thinner, and covered by the posterior. It emerges from the gray nucleus of the fourth ventricle, and is first visible coming from the front portion of the pons Varolii. Its fibres are motor. These two nerves join, and, perforating the dura mater, their course leads toward a shallow depression in the petrous portion of the temporal bone called Meckel's cave. There the posterior sensitive root develops into a ganglion. Its fibres spread, and ganglionary

cells develop into a flat, oblong body, the Gasserian ganglion. Motor fibres have no part in this formation.

From the convex border of the ganglion three nerves emerge, the ophthalmic, superior maxillary and inferior maxillary.

There are very important structures in the immediate vicinity, the internal carotid, middle meningeal, and cavernous sinus.

The nerves leave the cranial cavity by different openings, the supra-orbital fissure and the foramina rotundum and ovale, where the third branch is joined by the motor fibres of the anterior root. The object of the surgeon is to remove the sensory portion and to leave the motor. This is very difficult, as they are close together and deeply situated.

Etiology. Victor Horsley gives as the causes of trigeminal neuralgia. 1. Cold. 2. Worry and overwork. 3. Alcohol. 4. Ostitis of the alveolar borders of the jaws due to dental caries. 5. Rhinitis. 6. Traumatism.

Authorities differ as to whether the disease is of central or peripheral origin, but the consensus of opinion is that it is peripheral.

It occurs in the majority of cases about middle life or later, and is due to a degenerative change in the nerve and its ganglion, and probably in the bloodvessels supplying it. It attacks women twice as often as men. It seldom attacks men under forty, and is three or four times more frequent in women than men under forty. Heredity is of little importance. In about one-fourth of the cases there is a history of migraine, but the most common existing causes are cold, worry and overwork. The disease begins as a trigeminal neuritis, with herpes, associated often with disease of the gums and teeth. In a great majority of the cases it is the second or third branch that is involved.

It rarely begins in the ophthalmic, or remains localized in that branch, while it often affects the second and third branches for a long time.

Dana (*Journal of the American Medical Association*, May 5, 1900, p. 1100) divides the disease into two types:

1. The migrainous type of early life. A disorder of the central sensory neuron which may later develop into a true degenerative neuralgia.

2. The more common form, occurring after forty. A true infective neuritis, due to some local disease of the gums, or osseous tissues.

PATHOLOGY. The following degenerative changes were found on microscopical examination by W. G. Spiller in two cases operated on by Cushing, and illustrates the pathological condition that usually exists (*Journal of the American Medical Association*, May 5, 1900, p. 1094).

1. Tumefaction of the medullary sheaths and axis-cylinder in certain bundles only, in all three divisions of the ganglion.

2. Tumefaction of the axis-cylinder in a portion of the sensory root.

3. Numerous spaces in a portion of the sensory root, possibly resulting in part from degeneration of nerve fibres. The sensory root was not normal, and a return of the pain was possible.

4. Intense degeneration in the centre and peripheral end of the ganglion and its peripheral divisions.

The bloodvessels were not distinctly diseased, and there was no evidence that the condition of the nerve fibres was due to vascular degeneration.

The nerve cells offered no evidence of the theory of a cellular origin for tic douloureux.

Victor Horsley (*Clinical Journal*, London, October 27, 1897) says "this condition is one of neuritis, the mischief begins in the peripheral branches of the nerve, and cold is a frequent cause of neuritis." The pathological condition which we are called upon to treat surgically, when drugs and electricity have failed, according to all microscopical examinations, is apparently a form of chronic neuritis, due to a lesion of a mixed nerve in its peripheral branches, the tendency of which is to progressively ascend the trunk toward the nerve centre.

DIAGNOSIS. The fearful and distinctly localized pain renders the diagnosis easy, for as Trousseau (*Clinical Medicine*)

describes it: "An individual who but a moment ago was perfectly free from pain is suddenly seized with horrible pain while talking. He puts his hands to his face and presses it with considerable force, sometimes rubbing it so much and so often that the hair on that side falls of. He goes on rocking himself, holding his head between his hands and uttering half-suppressed groans. This lasts for ten or fifteen seconds, one minute at most, and all is over without convulsions."

The pain is so excruciating that the victims of it will readily consent to any operation, and are heedless of its danger, preferring death, and often contemplating and sometimes committing suicide to escape it. A patient of Murphy's expressed it most forcibly when he said, when told of the risks of an operation, "Anything you can get out of this better than death is clear profit."

TREATMENT. 1. *Medical.* No permanent good has ever been accomplished by narcotic drugs. In the early stages of the disease, during the first or second year, heroic doses of strychnine often arrest and control it. In cases that have existed over six or seven years a remission may occur, but no lasting benefit is obtained. Electricity sometimes palliates, but seldom cures.

2. *Surgical.* A variety of operations have been devised, developing gradually from the simplest to the most intricate and dangerous.

a. The nerves were cut (neurotomy).

b. Portions were excised (neurectomy).

c. They were pulled and twisted out of their bony canals (neurexeresis).

d. Nerves were divided close to their central origin.

e. Extirpation of the Gasserian ganglion.

Simple section of a nerve gave immediate and magical relief, but the result was temporary, owing to the reunion of the nerve-channels by reparative action. If the lesion is central, a superficial operation is useless. If it is peripheral, it is necessary to remove enough to prevent bridging of the gap. The value of resection, therefore, depends upon the amount of

nerve removed. Unless the duration of the disease is such that there is little doubt that the ganglion is involved, a peripheral operation should always first be made. If, however, there is a recurrence of the pain after one or more peripheral operations, the more radical operation of removal of the Gasserian ganglion is necessary to effect a cure. Tiffany (*Transactions of the American Surgical Association*, vol. xiv., 1896) offers the following suggestions for deciding when an intracranial operation should be made:

1. Intracranial operation to be thought of.

a. If more than one branch is affected.

b. If the painful area receives filaments from the branches near their exit from the head, *e. g.*, tongue, temporal region.

c. If the pain is not the expression of constitutional disease.

d. If a cause central to the ganglion does not exist.

e. If other measures have failed to relieve.

2. The intracranial operation that should be done is removal of the lower two-thirds of the Gasserian ganglion, with the second and third branches, as far as the foramina of exit from the skull, all in one piece, so as to be certain of the amount of tissue taken away.

3. The upper one-third of the ganglion and first branch may for the present not be excised for neuralgia. Three routes have been followed in making this operation, viz:

1. *Transmaxillary route* (Rose). Removal of the superior maxillary bone. A dangerous method, as the cranial cavity is left in contact with the mouth, and infection is most likely to follow. There is much deformity, and this route has been practically abandoned.

2. *Pterygoid route* (Rose and Andrews). Exposure of the foramen ovale by temporary resection of the zygomatic arch and coronoid process of the inferior maxillary. This route is difficult and dangerous, although not opening into the cavity of the mouth. The wound leaves much disfigurement. There may be necrosis of the zygoma and the coronoid process may be lost. There is often severe hemorrhage from the internal

maxillary artery and pterygoid plexus of veins. It is difficult to find the foramen ovale, the opening being sometimes hidden by the pterygoid spinous ridge. In trephining, the Eustachian tube may be opened and septic infection may result. The dura mater may be opened, and the internal carotid may be damaged. The ganglion cannot be clearly exposed, and frequently only fragments are removed.

3. *Temporal route* (Hartley-Krause). This is the best route and the one followed by most operators, with or without modifications.

The advantages are a short incision, with little division of the muscle, and a cicatrix which is hidden by the scalp. The ganglion can be exposed with slight risk of opening the subarachnoid space. The squamous portion of the temporal bone is the only portion of the skull divided. There is no danger of communicating with the Eustachian tube and pharynx. The principal difficulty and greatest danger is due to hemorrhage. The middle meningeal is often lacerated, necessitating much delay in reaching the seat of operation, frequently requiring packing, and a postponement of the operation. In order to reach the ganglion, it is necessary to elevate the brain and dura, so that it is often impossible to preserve the artery at the foramen spinosum. Krause advocates the double ligature of the vessel after it emerges from this foramen. This is difficult and often unsuccessful. The high temporal route is attended by many difficulties, which have been obviated to a great extent by Cushing's (*Journal of the American Medical Association,* April 28, 1900, p. 1035) modification of the Hartley-Krause operation, from which it differs only in detail. He calls it the "*direct infra-arterial method.*" "The trephine opening through the fossa temporalis is sufficiently low, so that the extradural manipulations may be conducted *underneath the arch made by the middle meningeal artery*, which is retracted with the dura, and yet remains uninjured at its two fixed points, namely, at the foramen spinosum of the temporal bone and the sulcus arteriosus of the parietal. Under this arch, with but slight elevation of the temporal lobe, the entire

ganglion and its sensory root may be exposed. This method gives the maximum of exposure, with the minimum of cerebral compression and injury of the bloodvessels."

The following are the steps in the operation as described by Cushing:

1. *Formation of muscle flap and exposure of temporal fossa.* A horseshoe-shaped skin incision is made in the temporal region, its base about four centimetres in breadth, corresponding to the zygomatic arch, and its convexity reaching about five centimetres above it, but slightly higher than the pinna of the ear. The incision is lower and smaller than the Wagner osteoplastic procedure as adopted by Hartley and Krause. The skin flap is turned downward, some branches of the temporal artery being divided, the underlying temporal fascia is exposed well on to its attachments to the zygomatic arch and the posterior or temporal border of the malar bone. An incision is then made through the temporal fascia, concentric with and just inside of the skin incision, and at the base of the skin flap it is carried along the middle of the outer surface of the zygomatic arch through the periosteum down to the bone. The periosteum is then elevated from the bony arch, leaving the masseteric attachment at its lower edge uninjured, and the zygomatic processes of the molar and temporal bones are divided with heavy forceps. An incision concentric with the skin incision is then carried down through the temporal muscle, and the muscle is scraped away from the bony wall of the temporal fossa, to which it has no attachment in this situation, and retracted downward together with the resected portion of the zygoma, and into the space which this bony arch formerly occupied.

In this way the lower portion of the temporal fossa of the skull, as far down as the attachment of the external pterygoid muscle, below the infratemporal crest, is well exposed.

2. *Exposure and elevation of the dura as far as the ganglionic sheath.* With mallet and gouge a small opening is made through the most prominent portion of the exposed great wing of the sphenoid, enlarged with rongeur forceps to a diam-

eter of about three centimetres, its lower margin carried well down, and including the ridge between the temporal and zygomatic fossa—the crista infratemporalis. The uninjured meningeal artery runs on the dura thus exposed, across the opening in the bone as the diameter of its circle. The dura with this vessel may then be lifted, almost bloodlessly from the base of the middle fossa until the first point of firm dural attachment of the foramen ovale is reached.

3. *Elevation of dura with meningeal artery and exposure of upper surface of ganglion.* By careful blunt dissection, and by working at the dural attachment about the foramen rotundum, and in the line between this point and the foramen ovale, where it is again firmly attached, the edge of the dural envelope which encloses the ganglion and its peripheral intracranial branches may be split, and by careful elevation the entire upper surface of the stellate structure be exposed well back on the sensory root, the ganglion being left in its bed still adherent in the underlying portion of the envelope.

4. *Liberation and extraction of the ganglion and its branches.* After the exposure of the upper surface of the ganglion, and before division of any of the peripheral branches, these three nerves with the ganglion and trigeminal root should be liberated from the attachments to the base. This is readily accomplished by working with the blunt dissector in the crotches between the second and third divisions, and also along each side of the nerves. After the ganglion and the second and third have been liberated, and can be lifted up by the dissector, it is necessary to free the superior and internal edge of the trigeminal root and first division. These manipulations should be conducted as near as possible to the sensory root, since that is the safest point and one at which there is less likelihood of injuring the cavernous sinus and sixth nerve. The ganglionic structure may thus be completely obliterated without division or laceration of a single branch. With a pair of hæmostatic forceps (Kocher's) the structure may then be grasped just back of the site of the true ganglion on the trigeminal root, the three peripheral divisions are in turn held

up with a blunt nerve-hook and divided with scissors close to their foramina, the sensory root is then evulsed by means of the previously attached pair of forceps.

5. *Closure and dressing.* The zygoma and flap of skin, muscle, and fascia are replaced. The resected portion of the zygomatic arch is replaced, and remains in position without wiring, as the masseter is paralyzed. The temporal muscle and fascia are secured in place by fine interrupted sutures at the upper curve of the incision, and a few sutures are taken in the divided periosteum and fascia over the replaced zygomatic arch.

In applying the dressing the eye is covered by a large sheet of rubber protective, which bridges across from the nose and forehead to the under prominence of the cheek and prevents the pressure of the bandage against the eye. Drainage is not employed. Primary union occurred in all cases and the resulting scars were very slight. He has not found it necessary to suture the lids, and thinks the local reaction resultant from this procedure would be detrimental in case there was an ensuing keratitis, which is at times unavoidable. This simple protective dressing keeps the eye moist, protects it from dust, and the patient may dimly see through the covering. A Buller shield answers the same purpose.

Prognosis. 1. Immediate result. 2. Remote result.

1. *The immediate result* of an operation is either relief or death.

a. The relief may be either partial or complete. If the entire second and third divisions and their respective portions of the ganglion have been removed, complete immunity will result. If the ganglion has only been partially removed, recurrence will follow.

b. Death may occur as an immediate result in several ways, viz.:

(*a*) Shock, due to loss of blood usually, but this is unlikely if saline infusion is employed.

(*b*) Hemorrhage, which it is impossible to arrest.

(*c*) Sepsis, with meningitis, due to lack of surgical cleanliness.

2. *Remote result.*

a. Recurrence due to an incomplete operation.

b. Destruction of the eye due to failure to properly protect it.

c. Paralysis of the muscles of mastication, due to removal of the motor portion of the third division. This is grave only when the condition is bilateral.

d. Abscess of the brain, due to rough handling during the operation.

MORTALITY. Tiffany's table of 108 cases (to May, 1896) gives a mortality of 22.2 per cent.

According to Carson's table of 100 additional cases (to March 25, 1899) the mortality was 11 per cent., a reduction of one-half (*Medical Review*, St. Louis, 1899, xxxix.).

Victor Horsley recently reported 21 cases with 2 deaths (*Practitioner*, September, 1900).

When we consider that these cases were operated upon by about fifty different surgeons, many of them making the operation for the first time, it is reasonable to suppose that with improved technique and increased experience the mortality from this most delicate and difficult operation will be still further reduced.

CONCLUSIONS. 1. Trigeminal neuralgia is an ascending neuritis, peripheral in origin. The second and third branches, rather than the first, are the ones most likely to be involved.

2. If the disease persists after several months' trial with drugs, electricity, etc., surgical intervention is indicated.

3. If only one branch is involved, and the disease is not of long standing, as much as possible of the affected branch should be removed, with a view of relieving pain and preventing the upward progress of the disease.

4. If more than one branch is involved, and the pain is severe, and has persisted for a long time, the ganglion should be extirpated, all other means having failed.

5. The temporal route should be followed. The Hartley-Krause operation, or preferably Cushing's modification of it, being the most rational procedure.

6. Pain will not recur with original severity in more than 1 per cent. or 2 per cent. of the cases operated upon, or in any degree in more than 4 per cent. or 5 per cent., and is invariably due to an incomplete operation.

7. It is important to remove the ganglion and its branches intact, in order to be certain of the completeness of the operation, and to insure a careful and thorough microscopical examination of the specimen.

8. The present mortality is about 10 per cent. Increased experience and an improved technique will undoubtedly diminish this mortality and dissipate the risks of this hitherto most formidable, difficult, and dangerous operation.

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RÉSUMÉ OF THE LATEST LITERATURE ON TUBERCULOSIS OF THE PERITONEUM.

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There is no more remarkable fact in surgery than that a simple laparotomy will effect a permanent cure in a large percentage of cases of tuberculous peritonitis.

The literature on this subject is comparatively recent; the earliest English monograph was by Van de Warker, of Syracuse, in 1887. In 1890, König gave an analyzed tabulation of 131 cases. About the same time Osler gave the subject special attention, and to him seems to be due the credit of making the first histological study of the process of healing after abdominal incision. He found fibrous tissue holding in its meshes a few giant cells and isolated tubercle bacilli.

In November, 1890, Parker Syms, of New York, read a paper before the New York Surgical Society on "The Influence of Laparotomy upon Tuberculosis of the Peritoneum." In 1898, Parker Syms (*Medical Record*, April 2, 1898) and B. B. Davis, of Omaha (*Journal of the American Medical Association*, 1898, vol. xxxi.) wrote excellent articles on this subject, and to them the writer is largely indebted for the information contained in this paper.

The literature prior to this time consisted of reports of cases in which laparotomy had been performed because of errors in diagnosis or as a means of making diagnosis, and in which cure had resulted by accident. Now, the literature is full of reports of cases in which the operation has been made as a recognized method of treatment. There are many theories

as to why an abdominal section should cure such an extensive and fatal disease.

1. It is claimed to be due to chemical disinfectants.

2. To drainage.

3. Exposure of the abdominal cavity to air and sunlight.

4. To the altered blood circulation due to the removal of ascitic fluid.

5. By the introduction of bacteria a toxalbumin is produced which is fatal to the tubercle bacilli.

6. A traumatism is produced by the opening of the abdomen and handling of the organs, which establishes a fibrinous peritonitis, resulting in encapsulation of the tubercle bacilli and their arrest.

7. Cure is due to the advent of leucocytes, and is the result of phagocytosis.

8. That a physiological change in the peritoneum is produced by a mere opening into the abdominal cavity, which makes it cease to be a proper soil for the culture of the tubercle bacilli.

No one of these theories has been positively demonstrated to be true, and some of them can be summarily disposed of. Cure does not depend upon the use of antiseptics, as in a long series of cases in which no such agents were employed there was a much higher percentage of cures than in a series of cases in which they were used.

It is not due to drainage, as patients do better without it than with it. It is not due to sunlight and air; we would hardly hope to cure a tuberculous joint by these agents; then why should we expect it in the peritoneum? It is not brought about by relief of pressure on withdrawal of ascitic fluid and consequent improvement of the blood circulation, as is shown in cases where fluid has been withdrawn without benefiting the patient and in which subsequent incision has resulted in cure.

We must remember that we really have no analogy to this phenomenon in other parts of the body, and it is therefore difficult to either prove or disprove the other theories.

Lawson Tait thought that opening the abdomen produced a change in the physiological character of the peritoneum, which rendered it able to overcome and destroy the tubercle bacilli.

Pichini made a microscopical study of the peritoneal tissue from a cured case, and concluded that after operation the tubercle underwent a connective tissue transformation.

Riva also found a growth of connective tissue, but observed that the process of transformation, instead of advancing from the periphery toward the centre, had its beginning in the centre of the tubercle.

Kischewsky was the first to experiment with the lower animals, and concluded that disappearance of the tubercle was due to leucocytic infiltration followed by an active development of connective tissue.

Up to this time (1894) observers agreed in the belief that healing of the peritoneal tubercle was due to a fibrous transformation of the cellular elements to sclerosis. The most important work in opposition to this commonly accepted theory was done by Gatti, of Turin. He studied carefully the development and decadence of the tubercle, and divided its life into three stages, viz.:

1. Fibrous stage, which includes histologically the miliary tubercle, the diffuse, and the first beginning of the nodular form.

2. The mixed fibrous and caseous stage, which marks the transformation from the fibrous to the caseous tubercle.

3. The caseous stage, after this transformation has been completed.

It has been proved by Gatti's numerous experiments upon guinea-pigs, rabbits, and dogs that if the operation be performed before the fibrous tubercle has reached its full development it is without effect. To demonstrate this, abdominal sections were made at all stages from a few days to many months after inoculation. The tubercles in process of healing were examined at every stage from twenty-four hours after operation until complete repair had occurred.

He found during the first week after operation that an amount of reddish, serous fluid exudes into the free peritoneal cavity and gradually diminishes in quantity from the first to the seventh day. The first to the third days showed the peritoneum slightly reddened; the third to the seventh days showed the tuberculous tissues slightly increased in volume. The vascular congestion was very slight and restricted to the periphery of the tubercles and to the normal peritoneum between them. The connective tissue showed no change, its cellular elements being in the same ratio as before, and, above all, there was no proliferation of the fibroblasts. The round cells were neither more numerous nor changed in appearance. Epithelioid cells were unchanged and the phagocytosis no greater than before.

Twelve days after operation beginning hydropic degeneration of the epithelioid cells was observed, drops and rings of fluid occurring in the cells. The entire protoplasm was here and there changed into a fluid containing the floating nucleus. No increase of fibroblasts was present. The tubercle bacilli were somewhat more numerous, phagocytosis was not increased. Gatti further asserts that connective tissue proliferation after laparotomy seldom occurs and only to a limited extent, and that it is not occasioned by the operation.

"In general," he says, "it may be absolutely observed that the increase in the stroma goes hand in hand with the development of the tubercle. If the tubercle is really influenced by the laparotomy, and the specific irritation which has occasioned the development of the epithelioid, lymphoid, endothelial, and connective tissue cells is arrested or diminished, so is the further growth of all these kinds of cells at the same time checked."

Gatti shows that as the epithelioid cells degenerate and the fluid is absorbed vacuoles are formed, and the surrounding zone of connective tissue simply presses in to fill the space occupied by the vacuoles. By this time the epithelioid cells have undergone hydropic degeneration and all tubercle bacilli have disappeared from the tubercle. The conclusion is

reached that healing is not brought about by connective tissue growth, and this error was made by the examination of cases that had fully healed. Connective tissue masses were found and the conclusion formed that healing occurred by pressure upon the specific elements of the tubercle by proliferating connective tissue. Only by examining animals at all stages after the operation can the process of healing be correctly studied.

Gatti's theory, therefore, is that the serum of the blood poured out after a laparotomy has antitoxic action, and, being brought into close contact for several days with the invading tubercle, by antitoxic action inhibits the growth or destroys the tubercle bacilli. In proof of this theory Gatti calls attention to the fact that if a laparotomy is done too early and before fibrous tubercle has completely formed, the operation is not instrumental in curing the disease, because the serum of the blood has not attained sufficient antitoxic strength to inhibit the growth of the germ; whereas a secondary operation, after the maturity of the fibrous tubercle, is followed by eradication of the disease.

In further proof of the antitoxin theory it has been suggested that a less favorable result when drainage is used is due to the removal of the antitoxin from the abdominal cavity, which thus being drained away prevents specific action on the tuberculous lesions.

Hildebrandt (*Münch. med. Wochenschrift*, 1898) performed a series of operations on healthy animals and on animals in which he had produced tuberculous peritonitis, and came to the following conclusion: The operation is followed by temporary arterial hyperæmia, most marked in the serous sheath of the small intestine, less marked in the large intestine, and least noticeable in the stomach and the parietal peritoneum. This is followed by a venous hyperæmia lasting from four to seven days in a healthy animal and longer in a tuberculous one. There is some paresis of the intestine. The amount of improvement which follows operation seems to be directly in proportion to the amount of venous hyperæmia which is

caused, and the venous hyperæmia is a phenomenon of inflammation due to the action of air upon the peritoneum.

Nannotti and Baciocchi think that operation sets up an inflammatory reaction of the peritoneum, increase of its absorbing power, phagocytosis, degeneration of the cellular elements, connective tissue growth, and vascularization of tuberculous nodules, with successive fibrous transformation.

Stchegoleff attributes the curative effect to a combination of traumatism of the peritoneum, thermic influence, penetration of air into the abdominal cavity, and perhaps action of light, causing irritation, followed by an inflammatory deposit.

R. T. Morris, of New York, concludes from experiments that recovery after operation occurs because putrefactive bacteria produce a toxalbumin in the peritoneal fluid which is fatal to the tubercle bacilli. The reason it is more effective in the peritoneum than the knee-joint and elsewhere is because of the exceeding abundance of the lymphatics of the peritoneum, bringing toxic agents which are absorbed into close contact with the bacilli.

McBurney thinks that the only change which could produce any effect after operation is the change in the vascular supply of the diseased tissue. Pressure being relieved, the tissue receives a larger supply of fresh blood.

R. Abbe (*New York Medical Record*, 1899) reports two remarkable cures the result of simple incision and flushing of the peritoneal cavity with saline solution. He attributes the good result to an acute engorgement of the tuberculous nodules, followed by rapid development of the bacilli with a fibrous investment, thus destroying the vitality of the tubercles and engendering a retrograde metamorphosis of the neoplastic tissue.

Weir believes that the engorgement of the tuberculous nodules and their subsequent disappearance is partly attributable to damage done to the peritoneal surface by opening the abdomen. This was the common factor in all relief procedures, whether incision or injection was resorted to.

Caillé (Augustus) thinks that the brief exposure to the air

or sunlight of a portion of the accessible infected area is apparently the starting-point of a reparative process in cases that have resisted other therapeutic efforts.

Of all the theories mentioned the antitoxin theory of Gatti seems to be the most rational, although the Scottish verdict of "not proven" obtains. It is very possible, however, that the good results secured may be due to a combination of several of the causes described.

Diagnosis. Clinically, we recognize two varieties of this disease, viz.:

1. With ascites.
2. Without ascites—*i. e.*, fibrous or ulcerous.

Pathologically, according to Adelbert's classification, there are three varieties, viz.:

1. Ascitic.
2. Fibrous (fibrinoplastic).
3. Ulcerous (caseous or suppurative).

The diagnosis is made chiefly by exclusion, as in tuberculous disease of other serous membranes, but the family and personal history may be of some importance. It is of the subacute or chronic variety when it comes into the hands of the surgeon, for local treatment cannot be of much service in the presence of a general, acute, miliary tuberculosis.

If the affection of the membrane be primary the tubercle bacilli floating in the blood having been arrested in the vessels of the membrane itself, and there developed, we may have an ascites of slow development, without rise of temperature or any serious disturbance of the general health.

Under these conditions we can only make a diagnosis before an exploratory incision by excluding the usual causes of ascites, such as diseases of the liver and kidneys, chronic valvular affections of the heart, and malignant tumors of the peritoneum and viscera.

On abdominal section exit is given to a clear, straw-colored fluid, sometimes sanguinolent, and the serous surfaces are found to be studded with white or yellow tubercles, which may be massed in tumors of considerable size. If very large,

these masses may sometimes be felt by bimanual palpation per rectum or per vaginam, and may simulate many different growths. If the peritoneal fluid be localized by pre-existing adhesions there will be a great resemblance to any of the solid or fluid growths peculiar to the locality. If confined to the epigastric or hypochondriac regions it may resemble hydatid cysts, cysts of the pancreas, enlarged gall-bladder, hydrosalpinx, or pyonephrosis. If the lower half of the abdomen alone be involved we might suspect pregnancy, ovarian tumor, hydrosalpinx, pyosalpinx, or pelvic abscess.

Tuberculous ulceration of the stomach, small intestine, appendix, colon, or mesenteric glands may involve the peritoneum by direct extension or cause peritonitis by perforation. The Fallopian tube is sometimes the primary focus. Osler estimates that the tube is involved in from 30 to 40 per cent. of the cases of tuberculous peritonitis, which probably explains the greater frequency of the disease in the female. It will usually be very difficult to differentiate without a cœliotomy.

Treatment. As we have a surgical disease to deal with, the treatment should be surgical and not medical. It is important, however, to pay great attention to the diet and hygienic surroundings and build up the general health by the judicious use of tonics, etc.

A simple laparotomy made rapidly, but with great care, on account of the liability of intestinal and other adhesions, without irrigation or medication of the abdominal cavity, promises the best result. In the great majority of cases, after evacuation of the fluid the wound should be sutured without flushing or drainage. If drainage is necessary, either a tube or iodoform gauze may be employed. The incision should be large enough to explore the abdominal cavity. When hydrops exists the cavity should be evacuated. When there is an encysted mass the adhesions should be separated and the cavity sponged out, provided it will not cause too much tearing and bleeding. When possible the original focus of the disease should be removed, as when

the female pelvic organs or the vermiform appendix is the site.

The mortality from the operation is less than 3 per cent. Marked improvement occurs in about 80 per cent., and a permanent cure is effected in about 50 per cent. of all cases operated upon.

CONCLUSIONS. From this résumé of the literature on this subject we draw the following conclusions:

1. Tuberculous peritonitis is a surgical disease and should be treated surgically and not medically, for the simple reason that when treated medically they die, and when treated surgically a cure is effected in a large proportion of cases and a marked improvement follows in all.

2. The proper treatment is a laparotomy, rapidly and carefully performed.

3. Danger from operation is very slight, the mortality being less than 3 per cent.

4. Of the many theories advanced to account for the cure in these cases the antitoxin theory of Gatti seems to be the most rational. It is not unlikely, however, that the good results attained are due to a combination of several of the various causes assigned.

5. Sepsis is not likely to occur, on account of the pathological changes that have taken place in the peritoneum.

6. Tuberculous infection of the wound does not occur.

7. Antiseptics are useless, and drainage should not be employed if it can be avoided, as it is apt to leave a permanent fistula.

8. Most of the deaths after the operation have been due to a general tuberculosis or tuberculosis of some other organ.

9. The successful treatment of this disease depends upon the diagnostic ability, good judgment, technique, and skill of the man behind the knife.

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SUBPHRENIC ABSCESS AS A COMPLICATION OF APPENDICITIS.

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The literature of this subject is necessarily limited. The standard text-books on surgery do not recognize appendicitis as one of the causes of subphrenic abscess. The most frequent causes mentioned are traumatic or ulcer of the stomach or duodenum.

The large experience of Wyeth[1] has only brought under his observation three cases of subphrenic abscess, and one of them was in association with the lesion of the kidney.

Ashhurst[2] has given it as his opinion that a large number of cases of appendicitis may be treated medically by opium and belladonna, and that even recurrent cases do not necessarily call for the knife. In this line I repeat my own position before the Medical Association of Georgia, that each case should be considered carefully and prayerfully.

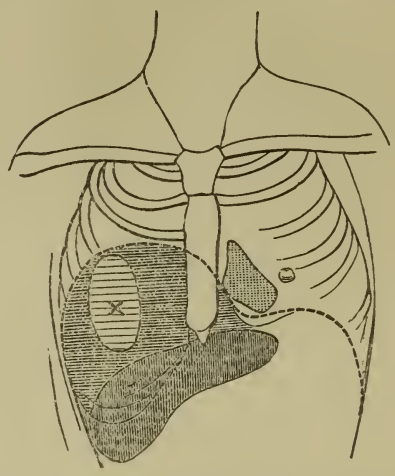
Leyden is one of the few writers to classify perforation of the vermiform appendix as a frequent complication of subphrenic abscess. He also mentions duodenal ulcer and empyema. His illustration, which may be utilized to advantage in this article, shows the positions of the liver, and of tympanites, with great precision. The liver is pressed down and the pus presses the diaphragm up.

Leyden and Ranvers[3] report cases of subphrenic abscess as occurring both in private and hospital practice. Leyden

[1] John A. Wyeth. Text-book of Surgery, p. 684.
[2] John Ashhurst, Jr. Principles and Practice of Surgery, p. 972.
[3] Berliner klinische Wochenschrift, November 14, 1892.

has been quoted by Baldwin[1] in his article on "Subphrenic Abscess Following Appendicitis," as stating that the liver is somewhat depressed, and there is often pain in the shoulder-blade, with hiccough, amphoric breathing below but not above the eighth or ninth ribs.

W. E. F., aged thirty-two years, was seen by me on June 3, 1900, for the first time. His family physician, Dr. J. W. Carmichael, had seen him the night before, and asked me to examine him with reference to pain in the region of the ap-



---- Diaphragm. — ≡ Pyoneumothorax subphrenicus dext. — × Zone of tympanitic sound. — ||| Liver.

pendix. Dr. W. Monroe Smith had been with him when he was first brought home. His condition led him to give him a hypodermic of morphine, $\frac{1}{4}$ grain, and atropine, $\frac{1}{150}$ grain.

The patient at 7 A.M. was found to have a temperature of 100.2°, respiration 26, and pulse 100 His countenance and general appearance gave evidence of a strong, robust man, prostrated by some serious complaint. The following prescription was given to be filled and used: Ung. belladonnæ, 1

[1] Virginia Semi-Monthly Medical News, July 14, 1900; Cleveland Medical Journal, August, 1900; reviewed by Journal of the American Medical Association, September 18, 1900.

ounce; pulv. camphoræ, 1 drachm. Sig.: Apply to the abdomen and cover with oiled silk.

Dr. Carmichael had administered a large dose of calomel, so that this was now followed by a tablespoonful of Epsom salts.

His condition betokened a fulminating appendicitis, and so the family physician remained to carefully watch and record his temperature, pulse, and respiration every half-hour until he could again be seen.

In the meantime all preparations were made for an operation and the family was advised of the necessity for surgical intervention. At 11 A.M. of the same day Drs. McFadden Gaston, Sr., J. W. Carmichael, and W. Monroe Smith met me to proceed with the preparations for the operation. He was given morphine sulphate, $\frac{1}{4}$ grain, and atropine sulphate, $\frac{1}{150}$ grain, hypodermically. His pulse had shown a marked acceleration, and the pain and suffering became unbearable. Two tablespoonfuls of castor oil and one teaspoonful of spirits of turpentine were administered, but no action on the bowels took place before the operation.

A. C. E. mixture was administered by Dr. Carmichael. The parts in the region of the incision intended were shaved and thoroughly cleansed with soap and water, solution of carbolic acid, and ether.

An incision one and one-half inches in length was made over the tumor noticed in the right iliac region near the border of the rectus muscle. This was increased to nearly three inches before the operation was completed. The fibres of the transversalis muscle and the rectus were divided with tearing motion of the fingers, and finally the aponeurosis was reached and an aperture made for the insertion of a directory, which was used to guide the scissors in cutting. In the same way the peritoneum was divided.

A small amount of dark fluid told of disintegration of tissue in the region of the appendix. A large piece of the omentum was excised after being ligated with catgut. The appendix was ligated with silk and cut with scissors. The appendix was gangrenous and contained one enterolith.

A portion of tissue near the appendix being ulcerated, was excised. The stump was treated with carbolic acid and allowed to drop back with no elaborate toilet.

The whole of the area of the peritoneum that could be seen was wiped with absorbent cotton, covered with sterilized gauze, previously dipped in hydrogen dioxide. Irrigation with normal salt solution and hot water was used. The peritoneum was sutured with interrupted catgut sutures. The fascia, muscles and aponeurosis were closed separately. Finally, the skin was sutured with interrupted silk ligature except at lower angle, left for gauze drainage. The patient stood the anæsthetic, and was placed in bed and given a hypodermic injection of strychnine nitrate, $\frac{1}{30}$ grain. He slept until 6 P.M., and when seen at 7.35 P.M. was not very restless. Temperature was 101°, pulse 95, and respiration 21.

I remained during the night with him, and he was very much nauseated from the anæsthetic. The same ointment mentioned was continued on the chest and left side, not disturbing the dressing on the right side, except for the purpose of loosening the strong bandage that became too tight as the gases of the intestines distended them. He asked for morphine and water, but neither were given him—neither were permitted. At 9.30 P.M. an enema of sulphate of magnesia, 6 ounces, was given. Another hypodermic of strychnine nitrate, $\frac{1}{30}$ grain, was given at 11.30 P.M., when his temperature was 99.8°, pulse 105, and respiration broken by retching. A quantity of bile was vomited. The respiration was hurried, and was not recorded at this time, but at 10 P.M. his pulse was 95 and temperature 100.2°.

Next morning at 5 the temperature was 100°, pulse (better tone) not recorded or distinctly counted.

At 8.30 A.M., temperature 99.5; pulse and respiration still indistinct. At night at 10 o'clock the temperature was 100.2°, and at 11.25, 101°, but the pulse was 80 and respiration 35.

It had been found advisable to keep up, every hour, a tablespoonful of the following: Lime water, 3 ounces; peppermint water, 1 ounce; camphor water, 2 ounces. Diffuse peritonitis

seemed to have existed with tympanites—and pain. The tongue was red and raw, of a typhoid nature, while the respiration was irregular, spasmodic, and accelerated.

The pulse, however, was the chief danger signal, and in this, I coincide with George F. Shrady, lies the chief index of the disease. The form of treatment instituted is that usually pursued in cases of septic tendency. Frequent dressings were used and free drainage was secured. When the temperature and the different symptoms suggested a lack of biliary secretion small doses of calomel were used. These produced full discharges and great relief therefrom.

Drainage from a small piece of sterilized gauze about one inch in width was obtained from the stump. The use of dioxide of hydrogen (Oakland) was continued for four weeks. The sublimate gauze was substituted for sterilized gauze on the third day, when the wound was found to show signs of healing externally. But owing to the fetid discharge noticed on drainage of gauze an opening was kept up. The best means to thoroughly disinfect the internal parts and to pick out dark and necrosed tissue were used at each dressing twice daily. The iodoform gauze was packed into the wound on the tenth day, after the stump was healing, as shown by the discharge of ligatures and the sloughed mass in which it was. The whole of the wound was filled with masses of gangrenous tissue. Upon remembering the fluctuation detected in the subdiaphragmatic region, it was thought necessary to reopen the wound and to favor drainage down through the original wound; this was the more urgent by the symptoms of pus. About this time Dr. Baldwin's paper appeared in the *Virginia Medical Semi-Monthly*. A complication of subdiaphragmatic abscess was evident. The pyogenic membrane and pus finally escaped at a dressing.

Milk was allowed for nourishment, and when no mercurial contraindicated its use fresh buttermilk was allowed and greatly relished.

Frequently great pain was experienced in the wound, but no morphine was allowed to be used. A local application of chloretone served a good purpose in the way of an anæsthetic,

Date.	Temperature.	Respiration.	Pulse.	Remarks.
1900				
June 1, 7.30 A.M.	...	...	...	Onset: Pain in McBurney's point.
June 2, 9.30 P.M.	102°	...	...	Hypodermic of morphine and atropine.
June 3,	100.6	30	90	Pain, tenderness, tympanites fluctuation under costal arch.
June 5, 9 A.M.	100.8	20	90	When asleep pulse 70.
June 5, 6.45 P.M.	102			
June 5, 10 P.M.	98 (axilla)			
June 6, 10 A.M.	99½			
June 6, 1 P.M.	101			
June 6, 8 P.M.	102			
June 7,	101.2			
June 7,	101	28	90	Beef soup, chicken soup; stronger and more regular pulse.
June 8, 1 P.M.	100.6	24	100	Bowels acted; cough; pain; asleep; calomel $^1/_5$ gr. every two hours.
June 8, 1.30 P.M.	100.8	20	80	
June 9,	100.1	20	90	
June 9,	100.2	28	88	
June 10, A.M.	100.5	30	90	Tonic prescribed.
June 10, 8 P.M.	101.8	30	90	
June 11,	.....	24	90	Iodoform gauze packed into wound.
June 11,	100.4	20	90	
June 12,	.....	...	...	Antikamnia and codeine tablets begun.
June 15, 8 A.M.	99.5	24	90	
June 15, 2 P.M.	100.4	30	90	
June 15, 6 P.M.	101	24	90	
June 15, 4.30 P.M.	103	...	100	Irregular respiration.
June 16, 1 P.M.	101.6	26	90	
June 17,	101.5	28	80	
June 17,	101.9	...	...	Variable pulse.
June 18,	100.4	24	100	
June 19, 8.30 A.M.	100.2	20	90	Dressed with Z. O.
June 20, 8.30 P.M.	103	28	85	Adhesive plaster, codeine, and antikamnia at 8.30 P.M., 11 P.M., 4.30 P.M., 11 A.M., 6.30 A.M. every night.
June 20, 9 P.M.	100.4	20	90	
June 20,	.....	20	80	
June 20,	.....	20	90	
June 21,	.....	...	90	
June 21,	.....	...	...	Pulse not counted.
June 21,	.....	...	90	
June 21,	100.1	...	90	
June 21,	99.6	28	100	

Date.	Temperature.	Respiration	Pulse.	Remarks.
1900				
June 22, 8.30 P.M.	99°	...	90	
June 23, 1 P.M.	101	30	85	Slept several hours in A.M.; looks easier; discharge less offensive.
June 24, 9 A.M.	100	...	90	Diagnosis of subdiaphragmatic abscess complicating appendicitis.
June 24, 11 A.M.	102	...	90	Cough released, and pressed down pus.
June 24, 5 P.M.	103.4	...	90	
June 25, 8.30 A.M.	101.5	Not taken	90	Dressing of sublimated gauze and pulv. camphoræ 1 dr., olei terebinthinæ 1 oz., olei olivæ 1 oz., poured on wound.
June 25, 3.15 P.M.	101.2	24	95	Pure, laudable pus on dressing.
June 26, 8.40 A.M.	100.2	28	...	
June 26, 10.10 P.M.	101.0	32	100	
June 26,	101.5	...	...	
June 27, 12.15 A.M.	.....	...	88	Pulse in the night of 27th, 8.20, 98; 10.5, 88. (Also on night of 27th, pulse at 12.15, 87; and at 1 50, 89.)
June 27, 1.30 A.M.	.....	...	85	
June 27,	101.8	29	90	
June 28, 3.45 P.M.	(Asleep)	24	90	
June 28, 3.45	Not taken	24	90	Pulse variable, once 87, again 89 and 93.
June 30, 8 A.M.	98.4	..	...	First time normal temperature once for two weeks.
June 30, 7.30 P.M.	99.4	...	...	
July 1, 9.30 A.M.	98.4	22	90	
July 1, 6.30 P.M.	99.4	28	80	
July 2, 9 A.M.	98.6	24	80	
July 3, 8.30 A.M.	98.6	21	80	
July 5,	102	24	...	
July 6, 8.15 A.M.	100.4	32	90	
July 7, 8.45 A.M.	100.2	28	88	
July 8, 8.20 P.M.	.....	...	89	Calomel given every hour from 8.20 P.M. to 1.20 A.M.
July 9, 8.15 A.M.	99	24	80	Pulse once 76.
July 9, 9.30 A.M.	102	Approximated	90	
July 10, 8.45 A.M.	98	Not taken	72	Dressed only at night.
July 10, 7 P.M.	99	Not taken	...	
July 11, 8.30 A.M.	98.4	Not taken	...	Strong, serous discharge; dressed once only.
July 13,	98.4	Not taken	77	Very little discharge, and that of a serous nature; granulating bridge; sitting up.
July 15,	98.8	24	92	
July 16,	98	12	...	Pulse not taken.
July 17, 8 A.M.	98	24	70	Wound much better.
July 24,	.....	...	...	Vineland grape-juice relished.
July 31,	.....	...	...	Recovery complete.

and the result sustains its use in painful lacerations, and in surgical operations. Chloretone was also given internally, and acted as an analgesic.

A combination of nickel bromide with other sedatives was used and the favorable effects of phenobromate were tested. Phenalgin was also given. As tonics, elixir of iron, quinine, and strychnine, tr. cinchonaco and strychnine nitrate tablets.

Soon after the operation great difficulty was experienced in securing movements on the bowels. For this purpose enemata of sulphate of magnesia were used. Finally, a large colon tube was inserted by Dr. Carmichael, and a complete evacuation was secured.

The diet was confined to broths and soups for some time.

A record of his condition each day was kept, and may be judged by his temperature, respiration, and pulse in the table on pp. 392 and 393.

Some remarks may be appropriate in reference to "Subphrenic Abscess following Appendicitis," for we find that rarely does this complication occur. Baldwin's cases make the forty-fourth and forty-fifth cases. He has studied the statistics presented in the monographs of Leyden, Maydl, and Sachs, with the addition of some cases reported in this country. Many of the cases were not diagnosticated until after the death of the patients revealed the condition. Pathological examination has shown that these cases may be extraperitoneal or intraperitoneal.

Baldwin's first case was one in which the appendix was found behind the cæcum, causing him to believe that the infection extended upward behind the peritoneum, and that the entire abscess was extraperitoneal. In this case the first operation was done June 6, 1899, and not till July 20th did the presence of a chronic abscess pointing on the right side become evident, and on the following day was evacuated by an incision immediately under the twelfth rib, an enormous amount of pus coming from a large cavity lined with ragged edges, and extending up toward the diaphragm above the liver. After thorough drainage the cavity closed in about six weeks.

The second case was in a young lady, sixteen years old. She was operated on the first time July 26, 1899, and then again on August 28th. The last time was for the subphrenic abscess, which had appeared below the twelfth rib. The liver was found normal, but with a mass of exudate back of the suspensory ligament with evident adhesions at this point. Baldwin describes the pus cavity found as about the size of a small orange, with a somewhat ragged interior, which was washed out with a counter opening for drainage. In this case the abscess cavity was packed with gauze and closed in two weeks.

In my case the symptoms were so evident from the start due to a subphrenic abscess from fluctuations below the twelfth rib and the rapid respiration. A channel, so to speak, was opened up by the cutting away of a large obstruction of adherent omentum during the operation for appendicitis.

The pyogenic membrane must have been very strong, as no pus was evacuated from this region when it was explored by my fingers. No septic contamination resulted on account of this thorough isolation of the subphrenic abscess from the appendicial wound. The extension of the inflammation may have been extraperitoneal, as in Baldwin's case. The direction of the discharge was from the diaphragm, as shown by coughing and deep respiration, bringing on quite a sudden outflow of pus. It could not have been an appendicial abscess alone, for no connection with this part of the wound seemed to exist. In Baldwin's cases there was a longer interval between the subsidence of symptoms in the appendicial region before pus was found above. Yet the case I report was so much more protracted that no other explanation could be given. Then the recovery was very prompt and permanent. The outcome was peculiarly fortunate, not requiring another operation.

One may seek to find in his previous history some cause for this subphrenic abscess; and it was ascertained that he had received a blow in his work on the railroad several months before. A pain and inflammation at this time remained in abeyance until after the time when the appendix was involved. The subdiaphragmatic abscess was certainly the most danger-

ous feature of his case, and could not have been cured by the entire closure of the wound, as advocated by Joseph Price and others dealing with appendicial abscesses alone.

[NOTE.—May 15, 1901. The patient has been examined lately and presents no signs of hernia or impaired health. He is able to do his work as engineer, requiring lifting.]

AN UNIQUE CASE OF INTRAPELVIC HEMORRHAGE DUE TO A HITHERTO UNDESCRIBED NEW-GROWTH.

By W. P. Manton, M.D.,
Detroit, Mich.

Although intrapelvic hemorrhage was mentioned by Ruysch as early as 1691, there appears to have been no successful systematic attempt at differentiating the various conditions leading to the blood effusion until the observations of Bernutz and Goupil, whose classical memoir was translated into English in 1866. These authors first directed attention to the fact that hemorrhage within the pelvis is not a "specific disease," but merely a symptomatic expression of morbid conditions existing within the pelvic structures, and demonstrated from careful and painstaking necropsies that blood extravasations in this location may take place not only as the result of "extra-uterine ovulation," but also from a variety of other causes unconnected with pregnancy. Unfortunately, although the cases cited by Bernutz under the caption "peri-uterine hæmatocele" are so clearly described that no doubt can be entertained as to the conditions detailed, he failed to recognize the circumstance pointed out by Hugier, in 1851, that intrapelvic hemorrhage may be either intraperitoneal or extraperitoneal, a fact which was particularly emphasized by Lawson Tait nearly forty years later, and is sufficiently well known at the present time. The determining of the location of the blood effusion, whether it be free[1]

[1] The words "*free*" and "*circumscribed*" were suggested by my friend Dr. Marcus Rosenwasser, of Cleveland, Ohio, as best indicating the location and nature of an

within the peritoneal sac or circumscribed outside of this membrane, is of the utmost importance, since upon this fact alone must largely be based the line of treatment to be inaugurated.

The assertion of Tait that all intraperitoneal hemorrhage is of ectopic gestation origin became at once so generally accepted that the teachings of the older writers were soon forgotten, and it is only within the past few years that clinical and pathological investigation has re-established the fact that, however rare, other morbid processes may be active in the causation of this condition.

So, too, in the extraperitoneal form of this disorder it is well established that tubal pregnancy, the sudden arrest of the menstrual flux, and the traumatisms incident to abdominal operations are not the only factors concerned in the production of this hemorrhage, but that this may take place in a variety of local lesions as well as in certain general somatic diseases. I am not aware, however, that extraperitoneal pelvic hemorrhage due to a distinctly pathological new-growth developing the lower portions of the broad ligaments and progressing upward with involvement of the tubes, and giving rise to marked degenerative and destructive changes in the bloodvessels of the part, has hitherto been described. On this account the following case is entitled to consideration not only because unique, but also as not devoid of clinical and pathological interest and importance.

M., aged thirty-three years, married; one child eight months ago; no abortions. Was first seen October 13, 1897. Menstruation had always been irregular, profuse, had increased in amount since marriage, and often lasted two weeks. Pain was sometimes, although not always, present. During pregnancy she was in poor health. Her labor was long and tedious, and was finally terminated by forceps. She states that she was torn at the time. She got

intrapelvic hemorrhage. It would still be less confusing, it seems to me, if intraperitoneal hemorrhage alone were known as *hematocele*, and extraperitoneal blood effusion only as *hematoma*, as is adopted by the Germans.

up on the tenth day following delivery, but fainted and was again confined to the bed for four days with "fever." Convalescence was protracted and she failed to regain her former health. About eight weeks ago—that is, six months after childbirth—she began to flow and suffered from severe abdominal pains, particularly in the left side, which drew up and cramped the leg, together with pain in the back "which nearly killed her." She was seen at this time by two physicians, who prescribed without affording relief and who failed to determine the cause of the condition. Two weeks ago she was seen by my colleague, Dr. Angus McLean, who succeeded in checking the uterine flow and discovered the presence of an abdominal tumor. The patient was sent to Harper Hospital and, through the courtesy of Dr. McLean, placed under my care.

Status Præsens. Patient is a brunette, of medium height, feeble, emaciated, and pale, with drawn and anxious features, as if she had recently undergone a serious illness. The stomach is irritable, and she is unable to take food in large amounts. There is no history of varicose veins.

Examination. Abdomen not much distended; parietes thin. The lower portion of the vagina is partially blocked by a swelling on the left side, which extends downward to within about an inch and a half of the introitus. The uterus is slightly enlarged, acutely anteflexed, and pushed to the right. The right pelvic fossa is occupied by a softish mass, but the parts are so exquisitely sensitive that its nature cannot be accurately determined. To the left of the uterus the tube can be made out greatly enlarged, elongated, sausage shape, somewhat irregular, and hard. Continuous with the tube is a yielding mass which completely fills this half of the lower pelvis and extends downward beside the lateral vaginal wall, causing the part to bulge into the lumen of that canal, as noted.

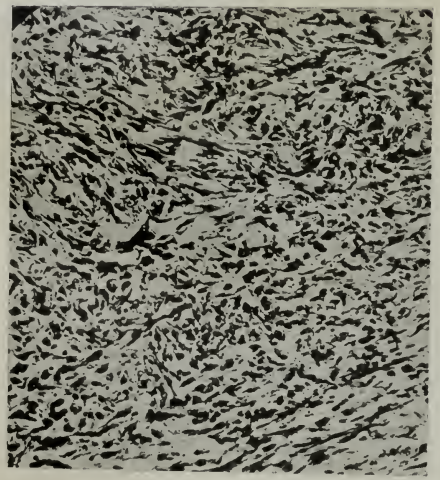
Diagnosis. From the history of the case and the examination the nature of the condition was not clear, and the diagnosis was left open. I was inclined to believe, however,

that we had to deal with either an ectopic gestation which had ruptured into the broad ligament, the accompanying hemorrhage distending the two leaves of the peritoneum, or a pus-tube with exudate and effusion of blood or serum. The patient was kept in bed for the next ten days and an effort made to improve her general condition.

Operation. (October 23d, before the students of the Detroit College of Medicine.) On opening the abdominal cavity both sides of the pelvis were seen to be symmetrically involved, the tubes were enlarged to the size of a small banana, and were attached to the pelvic wall and intestines by numerous adhesions, mostly recent, but some old and dense. In attempting to enucleate the left tube, the wall of which was very friable, it ruptured, and a quantity of dark fluid blood welled up from below. The tube was tied off close to the uterus with formalin catgut and removed. A large cavity in the broad ligament, extending deep into the pelvis and filled with old liquid blood-clots, remained. The right tube was also ligated and cut away, the same condition of the ligament existing as on the opposite side. The patient was then placed in the Trendelenburg position and more than a pint of liquid blood and clots removed by hand and sponging from each broad ligament cavity. There was no fresh oozing from the torn adhesions or from the ligaments. It is estimated that nearly four pints of blood and clots were contained in the two broad ligament hæmatomas. The edges of the several leaves of each broad ligament were then stitched together with kangaroo tendon, a glass drainage-tube placed in each cavity, the peritoneum cleansed, and the abdominal incision closed.

The patient left the table in good condition. The drainage-tubes were removed about the middle of the second day, 67½ drachms of bloody serum having been withdrawn. Metrostaxis began at the close of the first day and became quite profuse on the third day, but was then easily controlled. During the night of the second day the patient's right internal ear became painful and discharged a "highly

Fig. 1.



New-growth.

Fig. 2.

New-growth encroaching and absorbing normal tissue in broad ligament.

Fig. 3.

Hilus of ovary. Arteries—walls thickened by degenerative changes.

colored fluid." This continued for several days, but was gradually checked by syringing with a warm boric acid solution. The temperature remained practically normal until the beginning of the sixth day, when it gradually rose to 103°, remained high—between 99.8° and 102°—for several days, and then gradually declined. No specific cause could be found for this elevation at so late a period of convalescence. During this time the pulse varied considerably, ranging between 84 and 130. The general condition was, on the whole, good. During nearly the whole period of convalescence the patient's stomach remained quite irritable, and vomiting took place at intervals up to the ninth day. Finally, an excellent recovery was made, and the patient was discharged in good condition after nearly six weeks of hospital residence. Mrs. M. has been seen at intervals during the past three years and has remained in good health, no return of the pathological condition giving rise to the hemorrhage having at any time been manifested.

The parts removed were sent to my friend Dr. Heneage Gibbes, then Professor of Pathology at the University of Michigan, for examination.

REPORT BY DR. GIBBES.

The morbid conditions in the case are brought about by the growth of a tissue which has a fibroid character. From the appearances presented by a number of sections taken from different parts on both sides it seems that this new-growth originated in the broad ligament (Fig. 1).

The character of the growth varies as it becomes older; in those parts where it is growing rapidly and encroaching on normal structures it is composed almost entirely of cells; at a later stage a fibrous matrix is formed, in which the cells are embedded, and in the oldest part of the growth this matrix resembles dense fibrous tissue, with spaces in which lie the cells, varying very much in shape, some being oval, others stellate, while a few are multinucleated. In some parts the cells have become disintegrated and have dropped

out, leaving empty spaces, while many free nuclei are seen in the tissue. In the older parts the fibroid tissue has a tendency to become arranged in bundles running in various directions. The new-growth is well supplied with blood-vessels, mostly capillary, which are irregular in size and direction. This new-growth resembles some forms of recurrent fibroids which I have examined.

There is no doubt whatever that the aneurismal dilatations on both sides had the same cause, as all the sections show a new-growth of precisely similar character, but that on the right side is probably younger than on the left. This bilateral occurrence would negative the idea of a malignant neoplasm. The effect of this growth in all the parts involved is to absorb the normal tissue and replace them, and this process is well shown in many of the sections, where the transition from normal to new-growth is quite abrupt (Fig. 2). One characteristic of the growth, and the one that has brought about the condition in this case demanding operative interference, is its action on the bloodvessels. All through the sections the same condition is found, varying from a small hemorrhage to a large extravasation, the rupture of some vessel, and the filling of the spaces in the surrounding tissues with blood-corpuscles. It is very evident that the encroaching growth in some way increases the blood-pressure in the capillaries of the normal structure, as they are found much distended in some places and ruptured in others.

In other parts the new-growth forms the wall of a cyst containing blood in various stages of disintegration, showing that a large vessel has become involved in the growth. The aneurismal dilatations in both broad ligaments have, in all probability, been formed by the occlusion of large vessels by the degeneration of their wall owing to the growth of a fibroid material, as is well shown in the walls of the large and small arteries, and more especially in the valves and walls of the large veins. Many arteries are completely filled with clot in their neighborhood. The same condition is seen in cases of

senile gangrene of the leg, where the anterior and posterior tibial arteries and veins are affected in a similar manner.

In the present case the morbid change has probably been a very slow one. The peculiar effect of the new-growth on the circulation is shown in one of the sections of the ovary on the right side, where a large clot is seen in a vein at the spot where the new-growth impinges on the ovary, although the vein evidently runs in the broad ligament. Several large clots were found in vessels in the broad ligament, and they all are of the same character, homogeneous, and, from their reaction to the stain, probably containing lime salts. The large clot in the right ligament is mostly old, although here and there were small masses which shelled out and were composed of recent blood.

Both ovaries show the same morbid changes—dilated Graafian follicles forming small cysts, areas of hyaline degeneration varying in size very greatly, and a homogeneous degeneration of the walls of the arteries, which is especially well marked at the hilus (Fig. 3).

I do not think that these changes have any connection with the new-growth in the broad ligament, as I have seen exactly the same in many cases where the broad ligament was in a perfectly normal condition. The degeneration of the walls of the arteries in the hilus being, however, rather more pronounced than I have seen before. This new-growth appears to have some influence on the normal structures before it actually reaches them, as is shown by the ruptured vessels, hemorrhages, and, as is shown in one slide, commencing degeneration of the cells forming the ovarian stroma.

There is also a fibroid thickening of the periphery of the ovary which extends all around its circumference; this resembles fibrous tissue more than the new-growth. The occurrence of a bilateral growth producing such extensive yet similar changes makes this an exceedingly interesting case.

The above report suggests the question of treatment. What would have been the subsequent course of the condi-

tion had the vaginal route been selected for the evacuation of the hæmatomas and the diseased parts left, or subsequent abdominal operation elected?

From the history of the case, the operation find, and the microscopical examination it is evident that the disease was progressive, and that had the broad ligaments simply been emptied of their mass of blood the same condition of affairs —that is, repeated hemorrhages—would have continued, possibly terminating in the patient's death.

By the complete removal of the parts in which the pathological process was in active progress the disease was checked and the woman restored to health. Although this case is possibly unique, it certainly teaches the lesson that no one method of procedure should be adhered to in the treatment of either free or circumscribed intrapelvic hemorrhage, and that extraperitoneal blood effusion should not be left to take care of itself, whatever the cause, in the majority of cases.

SOME REMARKS ON EPIDURAL HEMORRHAGE WITHOUT FRACTURE OF THE SKULL, AND REPORT OF A CASE.

By J. Shelton Horsley, M.D.,
El Paso, Tex.

Though in recent years surgery has been advancing with seven-league strides, there is probably no region in which progress has been so marked as in the treatment of injuries to the brain and its membranes. Surgery of brain tumors and abscesses is in occasional cases brilliant, but, on the whole, unsatisfactory and productive of little good. In spite of the scholarly work of Victor Horsley, Munk, Ferrier, and others, location of brain tumors in the hands of skilled neurologists is most uncertain, and even when they are located surgical intervention is usually unjustifiable.

It is in traumatisms of the brain and its membranes that the advances in physiology, backed by modern surgical methods, have proved of such inestimable benefit. Experimentally, it has been determined that introduction of a non-irritating substance into the cranial cavity can be continued without producing cerebral symptoms until 6.5 per cent. of this space is filled. Above this amount evidences of pressure or compression are shown. If the amount introduced epidurally equals in volume one-twelfth of the cranial cavity fatal coma results. The effect also varies according to whether the substance is injected suddenly or gradually, the brain tolerating more compression under the latter condition. Pressure thus produced soon results in compression of the whole brain and consequent cerebral anæmia.

The chief sources of epidural hemorrhage are three: The sinuses of the dura mater, the veins of the diploë, and the middle meningeal artery or its branches. This last is much the most dangerous, as the slight pressure which is produced will usually check hemorrhage from the first two sources before much blood is lost if no fracture exists.

The dangers of epidural hemorrhage without fracture of the skull are, in the order of their importance, compression of the brain, shock, and exsanguination of the patient. The first is by far the most serious, and here localization of motor and sensory centres is of great value.

The diagnosis of this condition is most important, and in cases uncomplicated by cerebral injuries is comparatively easy if a correct history of the case can be obtained. The symptom which is wellnigh pathognomonic is an interval of consciousness between the time of injury and the first cerebral symptom. This interval may be a few minutes or many hours, depending upon the severity of the hemorrhage. During this time the patient feels perfectly well. Of course, epidural hemorrhage frequently exists when there is no such interval, but this class of cases will be found complicated with some trauma of the brain. Subdural or pial hemorrhage is rarely sufficient to cause compression, and cortical hemorrhage cannot exist without a lesion of the brain itself.

Other signs and symptoms of importance exist. There is usually some sign of injury to the scalp, if only a slight contusion. Inequality of the pupils is frequently found, the pupil on the side of the hemorrhage being dilated. This, however, is by no means always true. The period of coma from compression comes on gradually and is heralded by stupor, convulsions, and paralysis. Early convulsions point to the first seat of pressure. As it takes a considerable amount of blood to cause sufficient pressure for cerebral symptoms, by the time this quantity has accumulated a number of centres are covered and pressed on, and as pressure increases we find hemiplegia or paraplegia coming on gradually, according to whether the hemorrhage is on the side or the top of the

brain. In the latter instance there is hemorrhage from points on each side of the middle line, as a rule. This paralysis is at some time associated with convulsions of the rest of the body due to cerebral compression. Epidural hemorrhage at a distance from motor centres or tracts, as in the frontal region, cannot cause convulsions or paralysis (including paralysis of the iris muscle) until it has produced general compression. The speech centre is soon affected if the hemorrhage is near it. Breathing is slow, deep, and stertorous in a majority of cases, and is always slow where much bleeding exists. The pulse is usually slow and full, and later, when the heart and its ganglia become tired and the centre of the vagus paralyzed, is rapid and weak. It is frequently of unequal volume on each side. Temperature is subnormal. With severe general compression control of the bladder and rectum is lost.

Uncomplicated cases of epidural hemorrhage without fracture, and of sufficient severity to cause diagnostic symptoms, should be operated on as soon as possible; but, as Abbe has so truly said while speaking of perforations in typhoid fever, one should never be in such haste as to handicap himself too greatly by poor light, poor assistants, or unfavorable surroundings. It should also be borne in mind that epidural hemorrhage is frequently so complicated by injuries to the brain as to contraindicate operation, or at least to affect the time at which it should be done. Dr. Charles Phelps, of New York, says: "If other intracranial injuries have been sustained, which are obviously or presumably of immediately fatal character, operation will probably hasten rather than retard the catastrophe. It is only when symptoms point clearly to hemorrhage as the essential if not the exclusive lesion that operation for its relief will afford legitimate hope of success." The operation of trephining is a comparatively simple procedure, and in the hands of a surgeon of ordinary skill should be practically without mortality, just as exploratory cœliotomy is. In cases where there is reasonable doubt as to the severity of the cerebral lesions it is probably

best to trephine, remove clots, and stop bleeding. This will relieve pressure and give nature a chance to take care of the other injuries. The steps for this operation are detailed in surgical text-books and do not come within the province of this paper; but I wish to lay stress upon three most important features in the after-treatment, viz., free purgation, rest and cold applications to the head.

In reporting the following case I am aware that it is not very rare, nor is it unusual in any large city hospital with an emergency service; and I should, perhaps, apologize for reporting it; but it is a very typical case of epidural hemorrhage without fracture, and shows what can be done for such cases if operated on at the proper time. For these reasons I trust it may be of some interest.

R. R., aged twenty-one years; male; works in a steam laundry; previous health good. On March 4, 1900, about 9 P.M., he was struck on the head with a wooden club. He was momentarily stunned, but soon recovered and felt perfectly well. About an hour and a half after the injury he became drowsy, and within a few hours fell into a stupor. Dr. H. H. Stark was called in. At this time he could be aroused from the stupor, but would soon relapse into the same condition. The following afternoon Dr. J. A. Rawlings was called in consultation. The condition of the patient was rapidly becoming worse, and at seven o'clock on the evening of March 5th these gentlemen kindly referred the case to me for operation. There was a small contusion on the left parietal eminence. The patient was in profound coma. His pupils were slightly contracted, equal, and would not respond to light; breathing was slow and stertorous, but not very deep; pulse irregular and intermittent, and on the operating-table before the clot was reached would vary from 110 to 160; temperature 97° F. The right side of his body and face was paralyzed, and the left arm and leg were in constant jerking convulsions. He had lost control of bladder and rectum. Operation was performed at St. Luke's Hospital, with the assistance of Drs. Stark and Rawlings, at

8 P.M., an hour after the patient arrived. No anæsthetic was used at first, but convulsions of the left side were so annoying that chloroform was given. I intended making an osteoplastic flap with the trephine and Gigli saw, but as the patient's condition was becoming rapidly worse and haste was demanded to relieve pressure I trephined over the left parietal eminence and came down upon a large clot of blood. There was no fracture of the skull, not even a fissure. The trephine opening was enlarged with rongeur forceps and a quantity of blood, estimated from four to six fluidounces, was removed by means of the finger, a uterine curette, and small gauze mops on artery forceps. The opening was a little above the middle of the clot, which measured one and a half inches deep at its centre and covered an area about four inches in diameter. Only slight bleeding occurred after the clots were broken up and removed, so the space was loosely filled with iodoform gauze and a rubber drainage-tube inserted. A few silkworm-gut sutures were introduced and left untied. Bleeding from the scalp was free, but easily controlled by a continuous overhand suture of catgut, carried along the margins of the scalp wound, stopped all bleeding. His temperature was 98.5° F. an hour after operation, and did not vary as much as half a degree during the entire convalescence. Next morning the patient was conscious and answered questions intelligibly. On March 7th the dressing was changed, gauze and tube removed, and the sutures previously introduced were tied. The first week the patient was inclined to be noisy at night. Some superficial suppuration resulted, but otherwise he recovered uneventfully. He was discharged on April 9th.

RESECTION OF THE CERVICAL SYMPATHETIC FOR GLAUCOMA.

By Howard J. Williams, M.D.,
Macon, Ga.

For the clinical history of the following case, the privilege of operating, and much valuable assistance during the operation, I am indebted to my friend Dr. J. S. Shorter, ophthalmologist to the Macon Hospital.

T. P. W., white male, aged eighteen years, received a perforating lacerated wound of the cornea and iris of the right eye in 1887. Sympathetic trouble began in the left eye in September, 1894. For this latter condition he received antiphlogistic treatment to the left eye, and enucleation of the right globe. In June, 1897, vision = 20/100 +. One year later cataract had developed, further impairing vision, while the tension of the globe had increased to + 2. Iridectomy was then performed with partial success in reducing the tension. Later tension again increased. At the time he was referred to me for operation, July 5, 1900, he was suffering with secondary glaucoma dependent upon sympathetic iridocyclitis plastica, vision reduced to light perception and a continued increase of intra-ocular tension + 2. There was circumcorneal injection, and more or less pain in and around the left eye.

On July 7th he was anæsthetized by Dr. Derry, and, assisted by Drs. Shorter and Carswell, I performed Jonnesco's operation, resection of the superior cervical sympathetic ganglion. Along the posterior border of the left sternocleidomastoid an incision about three inches long was made from the mastoid

process to about the middle of the neck, just missing the external jugular vein. Behind the sternocleidomastoid the tissues were separated, exposing the trapezius muscle; the sheath of the carotid containing the artery, the internal jugular vein, and the pneumogastric nerve were found. Back of the latter and separated from it by the thin carotid sheath the ganglion was located lying on the major rectus capitis muscle. So close together were the two nerves, and so nearly of the same size and appearance, there was some hesitancy in deciding between them. By alternately pinching them and watching its effect on the rapidity of the pulse the pneumogastric was recognized and dropped. Stripping the ganglion and cutting away its branches, its lower end was severed from its continuation below, then with curved scissors the upper end of the ganglion was cut just as it emerges from the cranium. The wound was then closed and properly dressed.

Within a few minutes the conjunctiva was greatly congested, the eye suffused with tears, slight left lateral sweating, with redness of the left side of the face and ear began, and there was some flow of nasal mucus. The next day the patient had reacted well; pain in and around the eye was relieved, there was ptosis of the left eyelid, but, owing to fixation of the iris to the capsule of the lens, no change of the pupil was observed. In addition to the above symptoms, there was complete anæsthesia of the left ear and marked huskiness of the voice. The conjunctival injection, the lachrymation and nasal discharge gradually disappeared.

July 6th, when he was discharged from the hospital, intraocular tension had reduced from + 2 to normal, pain was entirely relieved and the patient claimed improvement in vision. Ptosis had slightly increased, and the globe had receded to some extent. The voice continued husky, due, it was found by the laryngoscope, to paralysis of the left vocal cord, while anæsthesia of the lobe of the ear was still present.

October 26th, Dr. Shorter reports that tension remains normal and that the field of vision is widened, but that he can find no improvement in acuteness of vision. The patient, however,

stoutly maintains that he does see better, and is urgently awaiting a promised operation for removal of the cataract by Dr. Shorter. He has had no pain since the operation. Ptosis is still present, though improving; the anæsthesia of the ear and paralysis of the vocal cord is almost entirely relieved.

It must be understood that the last two symptoms were not dependent upon the sympathectomy, but were the results of unintentional wounds of the special nerves, occurring in the course of the operation, and are not necessarily present in every operation.

Before beginning the discussion of my subject, I wish to distinctly state that this operation was not undertaken with any hope of improving the sight of this patient, but it was performed solely to relieve the pain in the eye and reduce the tension of the globe, thereby saving what vision there was from the destructive effect of a gradually increasing glaucoma. If there has been any improvement it is more than we expected, for the opacity of the lens and its capsule is the main barrier to vision in the case.

Division of the sympathetic nerve in the neck is an old experimental operation employed by physiologists to demonstrate the action of the sympathetic nervous system on the vegetative life of animals, its control over the vasoconstrictors in organs and tissues and its influence on the involuntary muscular system. Claud Bernard, in 1851, first demonstrated that vascular congestion and increased secretion followed section of the sympathetic nerve. Jonathan Hutchinson, in 1866, recognized the ocular symptoms attendant upon paralysis of the superior sympathetic ganglion. Jonnesco and Floresco[1] applying the technique of experimental research to patients about to have resection of the cervical sympathetic performed, have demonstrated the identity of the functions of this nerve in man and animals.

Irritation or stimulation of the superior cervical ganglion causes pallor of the head, dilatation of the pupils, and promi-

[1] Bull. de l'Acad. de Méd., Paris, August 14, 1900.

nence of the eyeballs; irritation of the inferior ganglion accelerates cardiac action, while stimulation of the middle is supposed to hasten the thyroid circulation; less is, however, known of the thyroid sympathetic control. Section of the superior nerve causes congestion of the head, lowered tension in the eye, paralysis of the dilators of the pupil and of the smooth fibres of the upper eyelid; retarded pulse follows section of the lower ganglia. Unilateral warmth, flushing, sweating, lachrymation, increased nasal secretion and saliva are the transitory symptoms of unilateral section of the first ganglion; the permanent symptoms, regardless of disease, are narrowing of the pupil, ptosis and retraction of the bulb.[1] In glaucoma the eye is under a state of tension in the circulation corresponding with stimulation of the sympathetic, and Hartwig, of Buffalo, says irritation of the sympathetic will certainly cause exophthalmic goitre.[2]

Sympathectomy, depending upon its physiological effects for its therapeutic results, has been undertaken for the relief of glaucoma, exophthalmic goitre, and epilepsy. Recently it has been performed in vertigo of cerebral anæmia (once) and essential migraine (once) by Jonnesco; in facial neuralgia (three times) and spasmodic torticollis (twice), once by Chipault[3] and once by Kalmus,[4] all reporting successful results. As a surgical procedure, it dates its birth practically to 1895, and its value is still a question awaiting the test of time.

Abadie, basing his deductions upon the theory that glaucoma is dependent on vasoconstriction, was the first to advise resection of the supreme ganglion in order to overcome the tension of the circulation in the eye in this disease. Dilatation of the arteries results from the operation, the blood-pressure is thereby lowered and extravasation is diminished; the pupils becoming contracted, the iris angle and the secretory canals are relieved of pressure, giving the aqueous humor a ready means of escape;

[1] Jonnesco. Centralblatt für Chirurgie, 1899, vol. i. pp. 161–170.
[2] Journal of the American Medical Association, July 7, 1900.
[3] Medical News, August 25, 1900.
[4] Beiträge zur klin. Chir., Band xxvi., Heft 1.

and further, the peribulbar muscles are relaxed, thus relieving the venous circulation. More blood circulates through the eye and the orbital region, nutrition is improved and waste products are more readily removed.[1]

In addition to the symptoms always present on section of the sympathetic, there is in glaucoma immediate relief of pain; intra-ocular tension falls in a few days to or below normal and improvement of vision begins. In some cases tension is relieved at once. Zimmerman noted in one case a fall from $+ 2\frac{1}{2}$ to much below the normal just after the operation. Dr. J. M. Ball, of St. Louis,[2] in one case saw it fall from $+ 2$ to $+ 1$ in twenty-four hours, and a second case from $+ 3$ to $+ 1$ in a short time. In my case, how soon the tension fell I cannot say, as Dr. Shorter could not make an examination until the tenth day; it had then fallen from $+ 2$ to normal. In cases where vision is not entirely lost improvement is gradual. Mohr reports improvement from 5/15 to 5/9, with an extension of the field of vision from 5° to 10°; Abadie saw vision increase after several months from 1/10 to 1/3 on the left, and 1/2 to 2/3 on the right.[3]

In Europe the operation has been performed in glaucoma more than thirty times by Abadie, Jonnesco, Chipault, Zimmerman, Demercheri, Mohr and others, with almost unvarying success, and it has become one of the established operations abroad. Cases are reported of relief lasting up to the third and fourth year after operation. In America the operation has not become so popular. Professor J. M. Ball in a personal letter states that he can learn of only three other surgeons on this side who have performed sympathectomy for glaucoma: Drs. G. F. Suker, of Toledo, D. H. Coover, of Denver, and A. R. Kiefer, of St. Louis. Each of these has had one successful operation. Dr. Ball has himself operated five times for glaucoma and once in atrophy of the optic nerve. Since his paper was read at the International Ophthalmological Congress

[1] Arch. d'Ophtal., February, 1899.
[2] Journal of the American Medical Association, June 2, 1900.
[3] M. Hartwig. Journal of the American Medical Association, July 7, 1900.

at Utrecht, and published in the *Journal of the American Medical Association* last June, he writes he has operated once for hemorrhagic glaucoma in a young man, aged twenty-five years; left eye completely blind, tension + 2, pupil widely dilated, the ophthalmoscope showing numerous hemorrhages and cupped disk, heavy continuous pain in and around the diseased eye. He had been advised to have enucleation performed for relief of the pain. Dr. Ball performed resection; one year later the eye is quiet, entirely free from pain, and tension is normal. Had sympathectomy been performed before vision was lost, he believes that the sight would have been improved. Abadie, he states, reports a similar case operated on in the earlier stages with good visual results. From his study of glaucoma, Dr. Ball is led to believe that the disease is an effect of pathological changes in the sympathetic nervous system resulting in microscopical changes in the nerve tissue of the superior cervical ganglion. He has kindly loaned me some drawings of sections of a normal ganglion and of excised ganglia removed for glaucoma, illustrating these pathological changes. A careful study of these drawings will show changes in the ganglia fully justifying the facts of his claim. As these drawings are to appear in his book on ophthalmology, I have taken the liberty of having copies made and present them in this connection. Professor Ball has the honor of being the first American operator to perform sympathectomy, and also of being the first to operate in atrophy of the optic nerve.

Sympathectomy is indicated in glaucoma simplex, inflammatory glaucoma where iridectomy has failed, hemorrhagic glaucoma early in the disease; and it should be tried in absolute glaucoma with pain, in preference to enucleation. In unilateral trouble the ganglion of the corresponding side should be excised. While sympathectomy may not be curative in every case of glaucoma, the results thus far have been sufficiently satisfactory to make it a desirable procedure in this much dreaded disease.

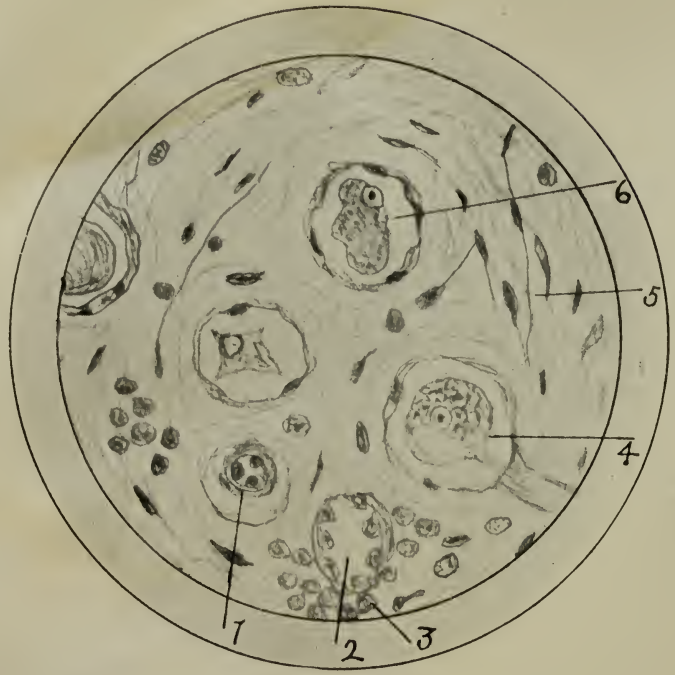
Bilateral removal of the three cervical ganglia in exophthalmic goitre is followed by relief of præcordial pain, decrease of the

pulse-rate and retraction of the balls of the eyes, but as far as I can learn there is little or no early diminution of the goitre following the operation. Little is definitely known of the physiological action of the middle ganglion; its branches to the thyroid gland are supposed, however, to control its secretory activity and its nutrition. If this be true, resection of the ganglion should produce some demonstrable action upon the thyroid circulation, change its size, or paralyze its secretions; simple section fails to show any results whatever, while removal of both the superior and middle ganglia alone has been abandoned as useless and incomplete in disease. Werthimer believes that certain fibres of the sympathetic chain in the neck does control the secretory function of the thyroid. This is doubtful, since it is stated by some operators that resection has no effect on the colloid matter secreted in the gland, as the goitre does not usually decrease in size. Combermale and Gaudier[1] agreeing with Werthimer, believe that after section of the main trunk the thyroid fibres cease to preside over the thyroid secretion, this secretion, in the disease under consideration being a toxin, causes the tachycardia. The drop in the pulse-rate, which is delayed, they think is due to the stoppage of the toxin secreted, for if it was due to the simple section of the nerve-supply to the heart, retarded action should come on immediately. In this connection, I would suggest that possibly Dr. Ball's experience in finding microscopical changes in the superior ganglion in glaucoma cases may be also true of all the ganglia in Graves' disease; if so, these nerve changes may so affect the functional action of the thyroid that toxin secretion would be excited. Further, it is claimed that sympathectomy meets with its best results in primary exophthalmic goitre, those cases in which the tachycardia precedes the enlargement of the gland, and in which the thyroidectomy is most fatal. Now, if Dr. Ball's theory of the possible dependence of glaucoma upon disease of the sympathetic system in which microscopical nerve changes appear is true, is it not possible that the good results

[1] Gazette hebdom. de Méd. et de Chir., April 24, 1898.

Fig. 1.

Normal superior cervical ganglion.



Microscopic appearance of superior cervical ganglion in a case of chronic irritative glaucoma. (Drawing from specimen.)

1, Artery; 2, vein; 3, area of small round-cell infiltration; 4, normal nerve-cell; 5, connective tissue; 6, atrophied nerve-cell.

Fig. 3.

Hemorrhagic glaucoma, superior cervical ganglion.

of the operation in primary Graves' disease is alike dependent upon the removal of a diseased chain of ganglia which affect the eyes, the thyroid and the heart through a toxin secretion of the thyroid gland? In secondary exophthalmic goitre the operation is less favorable; here the rapid pulse and exophthalmos come on after the goitre and are dependent upon its pressure on the vagus (Jonnesco). Thyroidectomy in this condition gives better results.

Jaboulay deserves the credit of introducing sympathectomy for Graves' disease, as he first advised the operation, and on September 2, 1895, made the first deliberate section of the cervical sympathetic (Hartwig). Combermale and Gaudier report a case in which there was early diminution of the exophthalmia, immediate disappearance of præcordial pain and a reduction of the pulse from 200 to 100 during the first week, but no modification of the goitre itself. Jonnesco reports immediate disappearance of the exophthalmos, relief of nervous symptoms referable to the heart, diminution of the trembling, tachycardia, carotid pulsation and thyroid thrill when present, and in one case a fall in the pulse from 140 to 70 and 80. In fifteen cases he has had 60 per cent. cured and 40 per cent. improved; one case he reports of unilateral operation with improvement of the corresponding side. Chipault reports six cases cured. Other European operators have had equally as good results.

In America I can find only one surgeon who has performed sympathectomy in exophthalmic goitre. Learning from Dr. Hartwig (personal communication) that Dr. Farquhar Curtis, of New York, had once operated, I wrote to Dr. Curtis, and, with his kind permission, I present the notes of his case, which have never been formally published:

"Woman, Irish, aged twenty-nine years, residence New York City, married. For two years she had had symptoms of exophthalmic goitre; admitted to Dr. Curtis' service, Bellevue Hospital, May 12, 1899; moderate exophthalmos; considerable nervousness. Thyroid gland much enlarged, estimated size of hen's egg on each side. Paralysis of right vocal cord.

Pulse not very rapid—106 the highest. Medical treatment tried and failed during two years.

"Operation May 17, 1899. Ether anæsthesia. Cervical sympathetic removed (first and second ganglia and cord down to the third), bilateral section. Wound sutured; primary union; no effect on pupils; gradual improvement in nervousness and exophthalmos; thyroid reduced in size; paralysis of vocal cord cured. Ten months later she was presented to the Neurological Society; the improvement had continued in all symptoms except the pulse. *This was more rapid and a cardiac murmur could be heard.*" (Italics H. J. W.'s.)

Dr. Curtis closes his letter with the remarks that the cardiac complications in the case may be of independent origin, but that the case is one which can be classed as a decided improvement, in which I fully agree. The doctor further states that this is the only case in which sympathectomy for exophthalmic goitre has been performed, that he knows of, in the United States. The results in Dr. Curtis' case are certainly sufficiently gratifying to encourage other American operators to follow his lead in this distressing disease. The results of resection of the sympathetic for this disease have been universally favorable, and thus far the operation has been without danger. Such being the case, total bilateral resection, though a delicate operation, is certainly superior to thyroidectomy, which is extremely hazardous, and it should be undertaken in all primary exophthalmic goitre cases in which medical treatment has failed.

Jonnesco, basing his perseverant advocacy of the operation in epilepsy upon the idea that the disease is due to cerebral anæmia, believes that complete bilateral resection of the cervical sympathetic so alters the cerebro-spinal circulation that hyperæmia takes the place of ischyæmia. Increased nutrition to the nerve cells is thereby supplied and the toxic products of disease are rapidly eliminated. Beginning in 1896, he has up to August of the present year made 126 resections, 97 of these operations having been undertaken for epilepsy. To him cer-

tainly belongs the honor of doing the first complete bilateral sympathectomy, and also the credit of persistently developing its various indications. He was not, however, the originator of the operation, not even for epilepsy. Alexander, of Edinburgh, is credited with having performed resection of the cervical sympathetic as early as 1889; Jaksch, Baracz, and Bojdanick operated in 1892 and 1893, while Jaboulay advised the operation in epilepsy in 1895. The rationale of the cure of epilepsy by sympathectomy is much less substantial than is the theory of the relief of glaucoma and exophthalmic goitre by the same procedure; while the results are far less encouraging. Jaboulay and Lanois,[1] in a study of the subject, expressed themselves as doubtful of the advisability of the treatment, having noticed that in those cases which were improved, and more especially in those which were cured, there was a strong hysterical element in the histories. Le Borde advises that it should be abandoned as a remedy for epilepsy. Chipault reports, in August, 1900, three cases cured and twenty uncertain in results. Schober, on the contrary, in 1899, showed that not a single case had been cured in all of the operations in Paris. Carl Beck, after reporting three cases,[2] comes to the conclusion that the operation has no value in epilepsy. In one other American operation, by Drs. Ed. J. Meyer and Hartwig (personal communication), as far as I can learn, the result is doubtful. Even Jonnesco's latest statistics,[3] embracing his entire 97 cases, shows only 12 cases cured, 7 improved, and 11 unimproved; while 45 cases, he states, had disappeared, or their results were unknown (?) Five of his cases died, not immediately, but soon after, of other complications. Still, Jonnesco enthusiastically continues to operate, even extending, in his last four cases, the operation so as to embrace the first thoracic ganglion. From these facts it would seem that sympathectomy in epilepsy must finally be abandoned, just as ligature of the vertebral arteries has been given over as useless, if not harmful.

[1] Rev. de Méd., January 10, 1899.
[2] Chicago Medical Review, 1899.
[3] Medical News, August 25, 1900,

The physiologists claim that resection of the cervical sympathetic in animals subjected to experiment is followed by permanent trophic changes and atrophy of the brain. As yet no such results have been noted in the human being operated on in disease. The operation is still too new, only four years old, to demonstrate what ultimate deterioration may result. Thus far, however, the beneficial results have remained permanent, and unless some remote baleful effects should be reported to detract from the value of the operation, sympathectomy will eventually receive a permanently recognized position as a surgical procedure in glaucoma, exophthalmic goitre, and other allied neuropathic diseases.

In this study I am largely indebted to the kindnesses of Drs. James Moores Ball, of St. Louis, M. Hartwig, of Buffalo, and B. Farquhar Curtis, of New York, for much valuable suggestion, information and material given by personal letters and clinical matters forwarded to me.

PUERPERAL SEPSIS: A PLEA FOR GREATER ACCURACY IN DIAGNOSIS, TO THE END THAT THE TREATMENT MAY BE MORE RATIONAL AND EFFECTIVE.

By Miles F. Porter, M.D.,
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The terms puerperal sepsis, puerperal infection, etc., like the mantle of charity, cover a multitude of pathological conditions.

How frequently do we see a paper entitled "Hysterectomy for Puerperal Sepsis" or "The Use of the Curette in Puerperal Infection." I am aware of the fact that in writing this paper I am laying myself open to the charge of being presumptuous, but I am confident that a little thought will convince the members of this Association that there has been an unwarrantable looseness in the use of terms by authors writing upon puerperal infections of various kinds, and am equally confident that you will agree with me in my belief that this looseness in the use of terms is conducive to improper methods of treatment. If a gynecologist of experience advises vaginal hysterectomy in "puerperal sepsis," or "curettage in puerperal infection," it does not follow that he will use either of these measures save in properly selected cases; but what will be the effect of such teaching on the general practitioner or upon the beginner in gynecology? Would any intelligent surgeon advocate the removal of the adnexa for puerperal sepsis? Yet the absurdity of such a proposition differs in degree only from "hysterectomy for puerperal sepsis."

Within the past week I read an article in which uterine curettage was advocated in all cases of "puerperal infection" as soon as the symptoms manifested themselves. No evidence need be adduced by me to prove that such a procedure carried out in all cases of puerperal sepsis would be productive of much harm. To recommend uterine curettage or hysterectomy in the majority of cases of puerperal infection is equivalent to saying that the source of infection in the majority of these cases is the uterus. There is plenty of evidence to prove that this is far from the truth. On the contrary, there can be no question but that the infection atria in the majority of cases are to be found either in the cervix or in the genital tract below that point. Especially is this true of primipara, hence the relatively large number of primipara, as compared with multipara, who suffer from puerperal infections. The terms "puerperal infection" and "puerperal sepsis" are continually being used to describe cases which differ as widely in pathology as does furunculosis from osteomyelitis.

These terms (puerperal sepsis and puerperal infection) indicate in part only the nature of these cases, and a half-truth may be as harmful as a falsehood. They are convenient cloaks for ignorance and convey no definite meaning. A diagnosis of "infection" is not sufficient. The character of the poison, the point or points at which it gained entrance, together with the pathological lesions which it has produced, must be ascertained before scientific and rational treatment can be instituted. The fact should not be lost sight of that a lying-in woman is subject to infections other than those caused by the lying-in state. Malaria and gastro-intestinal toxæmias, for instance. Serious and even fatal infection may occur through cracked or abraded nipples.

"Puerperal infection" or "puerperal sepsis" may manifest itself in either of the following pathological conditions or in a combination of two or more of them: 1. Progressive septicæmia. 2. Pyæmia (septic thrombophlebitis). 3. Septic intoxication (sapræmia). 4. Endometritis. 5. Metritis. 6.

Salpingitis. 7. Pyosalpinx. 8. Colpitis and vulvitis. 9. Peritonitis (general or local). 10. Cellulitis. 11. Ovarian abscess.

Strictly speaking, those infections which have their origin in the mammary gland or nipple as a result of childbearing are puerperal infections. To say that a woman suffering from one of the above-named conditions, or from a combination of two or more of them, has puerperal sepsis is to tell only a part of the truth, and, from a practical stand-point, a relatively unimportant part of it at that.

The successful treatment of a given pathological condition is much the same in the puerperal as in the non-puerperal woman. The danger of such operations are, however, materially increased by the puerperal condition. Manipulations of the womb, such as are necessary in doing a hysterectomy or a curettement, may dislodge a thrombus and cause embolism, and if the thrombus thus disturbed be infected we may transform by our manipulations a local into a general infection.

The danger of opening new avenues of infection without removing all infectious material is perhaps greater in the puerperal than in the non-puerperal woman. In some of the above-mentioned conditions—progressive septicæmia, for instance—all operations on the genitalia are (with rare exceptions, such as are noted below) worse than useless; they are harmful. Those cases only are operable in which the source of the infection can be removed before a lethal dose has been absorbed. The thorough cleansing and drainage of a womb in which is retained putrefying material will certainly stop the absorption of this material and will result in a cure, provided, however, that the cleansing is done before a fatal dose of toxins has been absorbed.

Perhaps, in rare instances, early cleansing or removal of infection atria may, by stopping the further ingress of germs, prevent a fatal issue from progressive septicæmia. Such a result can be explained only on the ground that the reinforcement of the bacteria in the blood-stream is stopped by

the operation before a sufficient number of bacteria have gained entrance to overcome the resisting power of the tissues. I am, however, constrained to believe that this favorable result is obtained less often than is generally supposed, and that many of the cases of septicæmia, so called, that are cured by operation are really cases of septic intoxication (sapræmia).

No surgeon would expect to cure a metritis in which the uterine walls were honeycombed with abscesses in any way save by hysterectomy; on the other hand, a hysterectomy done for an endometritis, or for a sapræmia due to absorption from the cavity of the womb, would be as bad surgery as would amputation at the shoulder for an abscess of the biceps or a localized osteitis of the humerus.

I have no doubt but that every member of this Association can call to mind an article recommending curettage, coupled with opening of the cul-de-sac and drainage, in cases of "puerperal infection," or can recall published reports of cases in which brilliant results were achieved by this method in cases of "puerperal sepsis." I have read a number of such articles and reports from the pens of men of authority, and there can be no doubt but that the treatment instituted was correct and that the results were highly satisfactory. I would not presume for a moment that these men did not fully understand the pathological conditions which they sought to remedy by these measures, but I do deny their right to take it for granted that everyone who reads their articles will know that by "puerperal sepsis" and "puerperal infection," as applied to these particular cases, is meant infection of the endometrium and pelvic peritoneum. It is the inadequacy of the terms they use to convey a correct idea of the pathological conditions for which they recommend these measures that is complained of.

The points I wish to make in this paper are:

1. That a diagnosis of "puerperal infection" or "puerperal sepsis" is inadequate.

2. That these terms are continually being applied to cases

differing widely in pathology and requiring radically different methods of treatment.

3. That this looseness and lack of accuracy in the use of terms has led, and will lead, to improper and harmful methods of treatment.

4. That practical accuracy in diagnosis is usually possible in the various forms of puerperal infection, and is essential to correct treatment.

AN AUTOMATIC LIGATURE PASSER.

By E. Pierre Mallett, M.D.,
New York.

[By Invitation.]

There seems to be such a multiplicity of new instruments and modifications of old ones constantly appearing that one hesitates to suggest another. Still, the most enthusiastic and advanced surgeon would hardly care to say that his methods and appliances have as yet reached perfection, so that any instrument claiming to simplify and expedite the graver operations will at least be regarded with interest by progressive men.

I have devised the instrument shown in the accompanying cut to facilitate the tying-off of pedicles and ligation of vessels in the most inaccessible parts of the abdominal cavity. As its principle is entirely different from that of any other instrument with which I am familiar, a somewhat detailed description is necessary. It is composed of two blades—the upper or transfixing blade being fashioned like an aneurism needle—with an open or self-threading eye. The lower blade is blunt and smooth and acts as a counter-pressure to the needle. In the end of this lower blade is a small slot just large enough to admit the needle of the upper blade, and across this slot is a groove which *receives* and *retains* the ligature until picked up by the needle. That comprises the entire mechanism.

The *modus operandi* is simplicity itself and is as follows: A ligature of the desired size (from No. 2 to 8 in commercial catgut) is first *firmly* placed in the groove across the slot of the *lower* blade. To pass the ligature this blade—the lower

one—is introduced underneath or behind the pedicle or structures to be ligated (generally being guided by the fingers of the left hand, which are grasping the pedicle), while at the same time the upper or transfixing blade is passing over the upper surface of the pedicle under the guidance of the *eye.* When that part of the pedicle is reached through which it is desired to pass the ligature the instrument is simply closed and *immediately* opened again, the ligature appearing in the eye of the needle blade, having been caught automatically from the groove of the lower blade and pulled up through the tissue.

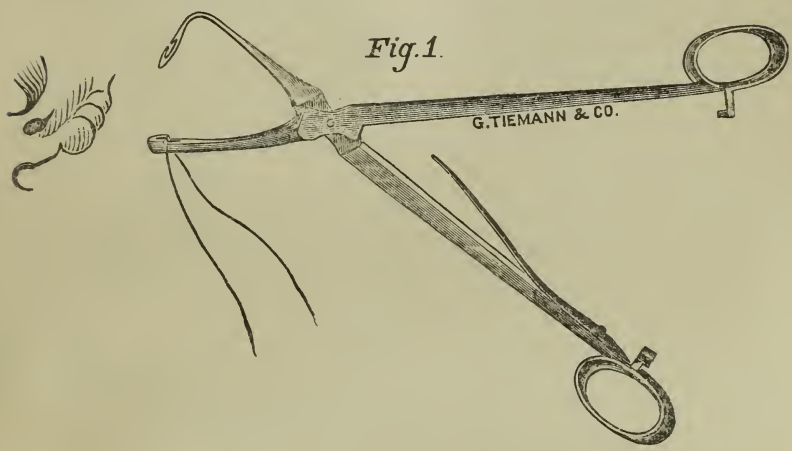


Fig. 1 in the cut shows the ligature in position upon the lower blade, with the needle blade ready to transfix the pedicle.

Fig. 2 shows the lower blade introduced underneath or behind the pedicle, the scissors blades having been closed and opened again, the ligature being caught by the upper blade and pulled up through the pedicle.

Fig. 3 shows the instrument being withdrawn, with the ligature in position to be grasped by the hand.

This instrument has been modified since I first designed it by the introduction of a strong spring in the handle, which makes its action as nearly automatic as possible, there being

practically but one movement necessary—that of firm compression of the scissors handles, the spring completing the

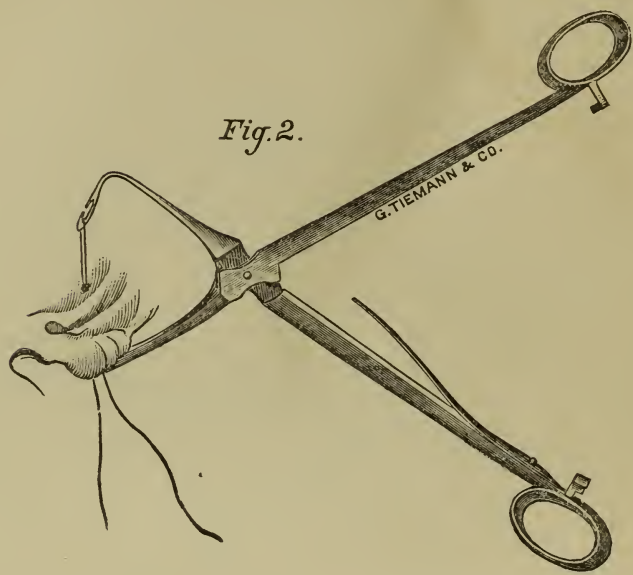


Fig. 2.

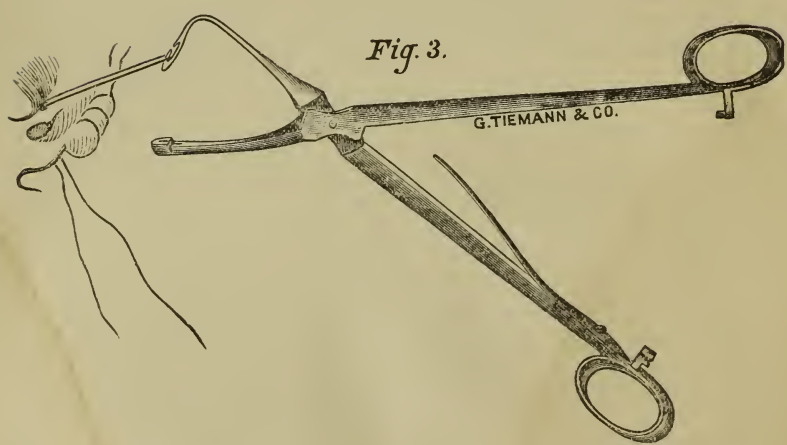


Fig. 3.

action by opening the blades when the compression by the hand is released.

Among the advantages which this instrument would seem

to possess over those in use at the present time for similar purposes are:

1. The ease, accuracy, and rapidity with which ligatures can be carried through any tissues.

2. It greatly facilitates the ligation of structures deeply situated in the pelvis, as in abdominal and vaginal hysterectomy.

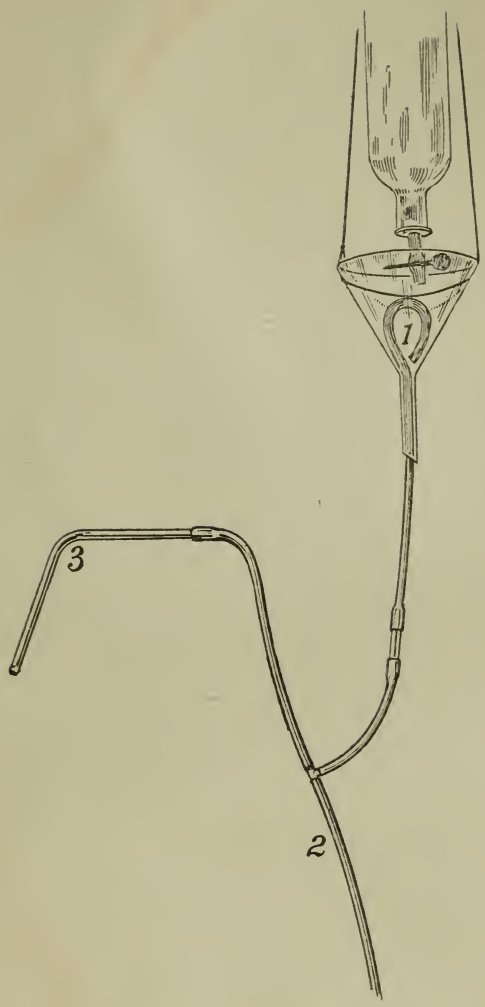
3. The operator is not dependent upon the skill and dexterity of an assistant in either catching the ligature when it has been passed through the tissues by the Deschamps or aneurism needle or in placing the ligature within the grasp of the Cleveland passer, if that instrument be used.

4. The operator is enabled to pass the ligature through any desired structure with one hand, while the other hand maintains the structure in proper position.

AN APPARATUS FOR DRAINING THE BLADDER IN CASES OF SUPRAPUBIC CYSTOTOMY.

By E. D. Martin, M.D.,
New Orleans, La.

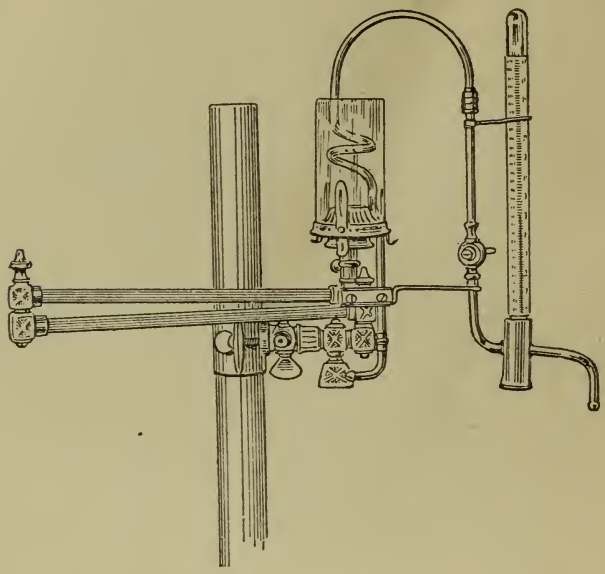
This simple apparatus has given so much satisfaction in several cases that I determined to present it here for your consideration. Those of you who have performed the suprapubic operation know the difficulties attending the after-treatment. The Dawborn siphon is the method usually adopted, but this does not work satisfactorily. Here we have something the patient can watch and keep adjusted. It consists, as you see, of an irrigator, a glass or tin funnel, some rubber tubing, a tube of glass or metal, and a glass tube for the bladder. By referring to No. 1 you will see that the tube is pushed through the opening in the funnel and then coiled on itself; the water from the irrigator is allowed to fall into the funnel drop by drop; as soon as it rises to the bend in the tube it will flow through, siphoning out the water in the funnel and priming the tube that leads from the bladder, thereby starting the drain and emptying the bladder. This will occur at intervals of from five to ten minutes, according to the time it takes for the water to fill the space in the funnel to the height of the curved tube; this, of course, can be regulated to suit the operator. An interrupted siphonage is preferable to a constant siphonage, as it requires less water to work it and exerts more force in suction. Caution should be taken to keep the tube marked No. 2 much lower than the tube No. 3, which goes in the bladder, otherwise the water would flow into the bladder instead of through the direct tube.



HOT-WATER DRIP FOR TREATMENT OF SUPPURATING WOUNDS.

The instrument that I present here is only original in its application. It has some decided advantages, and once set at the proper temperature will run uninterruptedly as long as

supplied with gas and water. It has been used, in a simpler form, in the Charity Hospital for the past twelve years. It



is so constructed that it can be attached to any bedpost and adjusted to reach almost any part of the body.

INDEX.

ABDOMINAL aortic aneurism by a preliminary exploratory cœliotomy and peritoneal exclusion of the sac, followed at a later sitting by wiring and electrolysis, treatment of, 272
surgery, 132
drainage in, 66
Abscess, subphrenic, as a complication of appendicitis, 387
Aneurism, abdominal aortic, treatment of, 272
Annual address of President, 1
Apparatus for draining the bladder in cases of suprapubic cystotomy, 430
Appendicitis, 387
in the male and female, 45
Atresia of vagina, flap operation for, 78
Auto-intoxication from renal insufficiency with and without diseased kidneys, 121
Automatic ligature passer, 426

BISECTION of uterus, 25
Bovée, J. Wesley, 18, 33, 43, 108
Brown, George S., 148, 237, 268

CAMPBELL, M., 130
Carbolic acid in surgery, 238
Carcinoma, surgery of the stomach for, 84
Carotid artery, excision of external, for inoperable sarcoma of face, 112
Cartledge, A. Morgan, 1, 18, 175, 267

DANDRIDGE, N. P., 331
Davis, W. E. B., 34, 76, 174
Dislocation of humerus with fracture of upper part of shaft, 331
Drainage in abdominal surgery, 66
Draining the bladder, apparatus for, 430

EARNEST, J. G., 106, 184, 187
Engelmann, George J., 36, 97, 265

Enteritis, pseudomembranous, 132
Epidural hemorrhage without fracture of skull, 405
Excision of the external carotid artery for inoperable sarcoma of the face, 112

FACE, sarcoma of, 112
Fistula, vesicorectal, 148
Fistulæ, vesicovaginal, 139
Flap operation for atresia of vagina, 78
Fracture of skull, 405

GALLSTONES, rapid and simple operation for, 164
Gangrene, traumatic, 348
Gasserian ganglion, surgery of, 364
Gaston, J. McFadden, Jr., 260, 261, 387
Gastro-enterostomy with the Murphy button in malignant obstruction of pylorus, 355
Glasgow, F. A., 132, 263
Glaucoma, resection of cervical sympathetic for, 410

HARDON, VIRGIL O., 185
Hemorrhage, epidural, without fracture of skull, 405
intrapelvic, unique case of, 397
Hoke, Michael, 229
Holmes, J. B. S., 55
Horsley, J. Shelton, 264, 405
Humerus, dislocation of, 331
Hypospadias and epispadias, with special reference to their operative treatment, 188

INOPERABLE sarcoma of face, 112
Intrapelvic hemorrhage due to a hitherto undescribed new-growth, 397
Irreducible incarcerated retroflexed gravid uterus, 177

JELKS, JAMES T., 121, 131, 161, 264
Johnston, George Ben, 39, 62, 110

KELLY, Howard A., 17, 25, 37, 38, 43, 58, 74, 83, 164, 259
Kidneys, diseased, 121
Kime, R. R., 153, 162, 264

LIFE-SAVING measures in obstetric work, 153
Ligature passer, automatic, 426

Litholapaxy, case of, 148
Long, J. W., 21, 66, 77, 266

MACDONALD, WILLIS G., 16, 17, 31, 36, 84, 95, 145, 261.
MacMonagle, Beverly, 19, 35, 76
McGannon, M. C., 130, 138, 146
McMurtry, Lewis S., 14, 38, 59
McRae, Floyd W., 45, 64, 94
Mallett, E. Pierre, 18, 426
Manton, Walter P., 160, 397
Martin, E. Denegre, 227, 262, 430
Matas, Rudolph, 272
Medullary narcosis, 8
Menstruation, normal, 97
Meriwether, Frank T., 355
Murfree, J. B., 348
Murphy, John B., 334

NARCOSIS, medullary, 8
Neff, Wallace, 364, 377
Nicolson, William P., 60, 112, 119
Noble, George Henry, 78
Normal menstruation, 97

OBSTETRIC work, some life-saving measures in, 153
Obstruction of pylorus, malignant, 355
Operation devised for the treatment of marked prolapse of the rectum in women, 108
for gallstones, rapid and simple, 164
Operative work, limitations of, 1
Osteoarthritis of spine, 229
Osteofibromyoma of uterus, 39
Ovarian tumor, solid, 184

PARHAM, F. W., 117, 188
Peritoneum, tuberculosis of, 377
Plea for the better appreciation of the limitations of our operative work, 1
Porter, Miles F., 421
Powell, Seneca D., 20, 111, 238, 260, 268
President, annual address of, 1
Prolapse of the rectum in women, 108
Pseudomembranous enteritis and its relation to abdominal surgery, 132
Puerperal sepsis, 421
Pylorus, malignant obstruction of, 355

QUINN, WILLIAM A., 177

RAPID and simple operation for gallstones found by exploring the abdomen in the course of a lower abdominal operation, 164
Rectum, prolapse of, in women, 108
resection of, 334
Removal of pelvic inflammatory masses by the abdomen after bisection of the uterus, 25
Renal insufficiency, auto-intoxication from, 121
Resection of cervical sympathetic for glaucoma, 410
of rectum per vaginam, 334
Résumé of the latest literature on tuberculosis of peritoneum, 377
Retroflexed gravid uterus, 177
Rodman, W. L., 8, 22, 60

SARCOMA of face, 112
Sepsis, puerperal, 421
Simons, Manning, 74
Skull, fracture of, 405
Spine, osteoarthritis of, 229
Subphrenic abscess as a complication of appendicitis, 387
Suprapubic cystotomy, apparatus for draining the bladder in cases of, 430
Surgery, abdominal, 132
carbolic acid in, 238
of Gasserian ganglion, 364
of stomach for carcinoma, 84

TECHNICAL improvements, recent, in the surgery of the stomach for carcinoma, 84
Traumatic gangrene, 348
Tuberculosis of peritoneum, 377
Tumor, ovarian, 184

UTERUS, bisection of, 25
osteofibromyoma of, 39
retroflexed gravid, 177

VESICORECTAL fistula, case of, 148
Vesicovaginal fistulæ, 139

WATKINS, I. L., 158
Welch, W. H., 41
Westmoreland, Willis F., 59
Williams, Howard J., 410
Wyman, Hal C., 37, 57, 93

Date Due

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